

# INSTALLATION AND OPERATING INSTRUCTIONS

## Models

P-R185A to P-R405A

C-R185A to P-R405A

## Low NOx

P-R185AL to P-R405AL

C-R185AL to C-R405AL

## RP2100

SWIMMING POOL  
and  
SPA HEATER



**WARNING:** If the information in these instructions are not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS**
  - Do not try to light any appliance.
  - Do not touch any electrical switch; do not use any phone in your building.
  - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
  - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

This manual should be maintained in legible condition and kept adjacent to the heater or kept in a safe place for future reference.



# Raypak®

A Rheem® Company

Part No. 240612

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# PART ONE - OWNER'S OPERATING INSTRUCTIONS

**FOR YOUR SAFETY - READ BEFORE OPERATING**

**WARNING: IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.**

## SECTION 1 / START-UP PROCEDURES

Your Raypak Pool/Spa heater has been designed for years of safe and reliable pool/spa water heating. It is available in millivolt or electronic control options. ASME certified units, typical used in commercial applications, are also available. This manual provides operation, installation, maintenance, and service information for these heaters.

If your heater has been installed correctly, operating the heater is an easy task. The upper front panel of the heater contains the control center that allows you to turn the heater on or off and adjust the temperature settings for the pool or spa. The temperature range is 65°F (18°C) to 104°F (40°C). The heater with the electronic control option also has a manual switch located on the right cabinet side to allow you to turn the heater off. Section 4 contains more details about the use of the controls in the Controls Adjustments/Replacements sub-section.

### BEFORE START-UP

#### BURNERS

Clean main burners, combustion fan and air louvers of dust, lint and debris. Keep heater area clear and free from combustibles, flammable liquids and chemicals. Do not obstruct the flow of combustion and ventilating air.

#### WATER

Water must be flowing through the heater during operation. Insure that system is filled with water and have pump operating.



RP2100 DIGITAL IID CAPRON



RP2100 DIGITAL IID ASME

**CAUTION:** Propane gas is heavier than air and will settle on the ground. Since propane can accumulate in confined areas, extra care should be exercised when lighting propane heaters.

## LIGHTING INSTRUCTIONS AND SHUT-OFF PROCEDURES

### MANUALLY LIGHTED PILOTS MILLIVOLT SYSTEM

- A. This appliance has a pilot that must be lighted by hand. When lighting the pilot, follow these instructions exactly.
- B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.


#### WHAT TO DO IF YOU SMELL GAS:

- \*Do not try to light any appliance.
- \*Do not touch any electric switch; do not use any phone in your building.
- \*Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

\*If you cannot reach your gas supplier, call the fire department.

- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, do not try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been underwater. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been underwater.

### LIGHTING INSTRUCTIONS

1. **STOP!** Read the safety information above.
2. Set the thermostat on the lowest setting.
3. Turn On/Off switch to the "Off" position.
4. Remove heater door panel.
5. Push in gas control knob slightly and turn clockwise  to "Off".

**NOTE:** Knob cannot be turned from "Pilot" to "Off" unless knob is pushed in slightly. Do not force.

6. Wait 5 minutes to clear out any gas. If you then smell gas, **STOP!** Follow "B" in the safety information above. If you don't smell gas, go to the next step.
7. Locate pilot mounted on the right side panel of the burner drawer. For burner drawer location, see location of control section, page 20.

#### GAS CONTROL KNOB SHOWN IN OFF POSITION

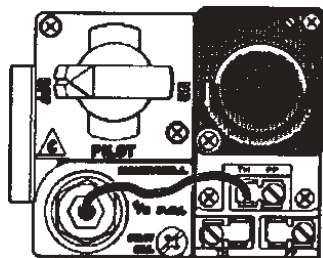


Fig. # 8081.0

HONEYWELL  
GAS VALVE  
MILLIVOLT

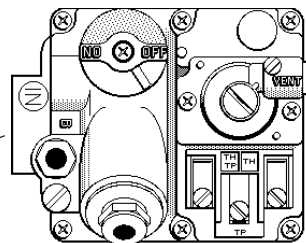
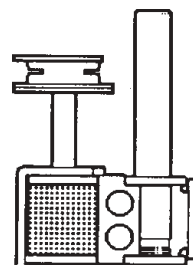


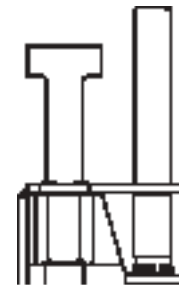
Fig. # 8079.0

ROBERTSHAW  
GAS VALVE  
MILLIVOLT





HONEYWELL PILOT

Fig. # 8083.0



ROBERTSHAW PILOT

Fig. # 8084.1

8. Turn knob on gas control counter-clockwise  to "Pilot"
9. Place flame to end of pilot tube. Push in control knob all the way and hold to light pilot. Continue to hold control knob in for about one minute after the pilot is lighted, release knob and it will pop back up. Pilot should remain lighted. If it goes out, repeat steps 5 through 9. \*If knob does not pop up when released, stop and immediately call your service technician or gas supplier.
10. Stand to the side of the heater and turn the gas control knob counter clockwise to  "On".
11. Replace heater door panel.
12. Turn On/Off switch to the "On" position.
13. Set thermostat to the desired setting.

### TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to the lowest setting.
2. Turn On/Off switch to the "Off" position.
3. Remove heater door panel.
4. Push the gas control knob slightly and turn clockwise to  "Off". Do not force.
5. Replace heater door panel.

**CAUTION:** Propane gas is heavier than air and will settle on the ground. Since propane can accumulate in confined areas, extra care should be exercised when lighting propane heaters.

## OPERATING INSTRUCTIONS AND SHUT-OFF PROCEDURES

### AUTOMATICALLY LIGHTED PILOTS ELECTRONIC IGNITIONS SYSTEMS

A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.

B. BEFORE OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

**WHAT TO DO IF YOU SMELL GAS:**

- \*Do not try to light any appliance.
- \*Do not touch any electric switch; do not use any phone in your building
- \*Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

\*If you cannot reach your gas supplier, call the fire department.

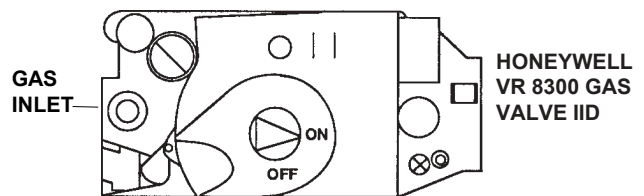
C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Force or attempted repair may result in fire or explosion.

D. Do not use this appliance if any part has been underwater. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been underwater.

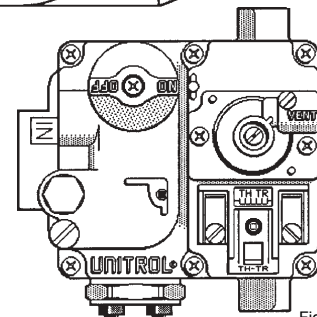
## OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above.
2. Set the thermostat to the lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
5. Remove heater door panel.
6. **For Honeywell Valve:** Turn gas control knob clockwise to "Off".  
**For Robertshaw valve:** Turn gas control knob clockwise to "Off". (Models 265-405) Push in and move gas control lever counter-clockwise to "Off" position. (Model 185)
7. Wait 5 minutes to clear out any gas. If you then smell gas **STOP!** Follow "B" in the safety information previously stated. If you don't smell gas, go to the next step.
8. Turn gas control knob counter-clockwise to "On". (Honeywell VR 8300 and Robertshaw 7000)
9. Replace heater door panel.
10. Turn on all electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

GAS CONTROL KNOB SHOWN IN "ON" POSITION

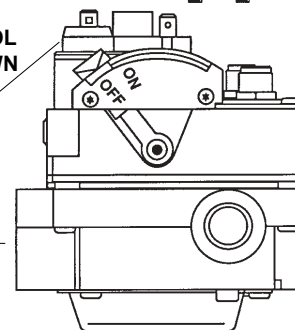


ROBERTSHAW 7000  
GAS VALVE IID  
MODEL 265-405



GAS CONTROL  
LEVER SHOWN  
IN "OFF"  
POSITION

GAS  
INLET



## TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat at the lowest setting.
2. Turn off all the electric power to the appliance if service is to be performed.
3. Remove heater door panel.
4. **For Honeywell VR 8300 and Robertshaw 7000 gas valve.**  
Turn gas control knob clockwise

to "Off". Make sure knob rest against stop.

**For Robertshaw 7200 gas valve.**

Push in and move gas control lever counter-clockwise to "Off" position.

5. Replace heater door panel.

## AFTER START-UP

Feel the inlet and outlet pipes. Outlet pipe should be only slightly warmer than the inlet. It should not be hot.

**WARNING:** *Should overheating occur or the gas supply fail to shut off, turn off the manual gas control to the appliance.*

### VISUAL INSPECTION

With the heater on, remove the door and make a visual check of the pilot and burner.

The flame should be blue with a well-defined pattern.

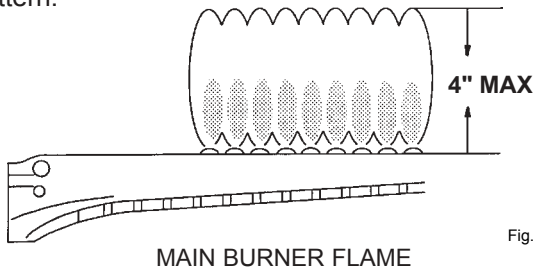


Fig. # 8205.2

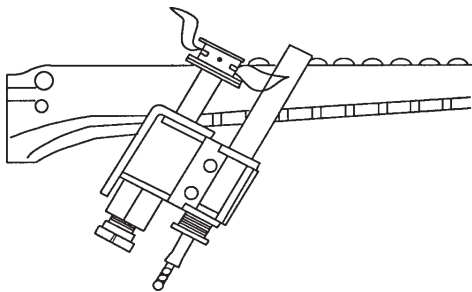


Fig. # 8964.1

A yellow or "floating" flame indicates restricted air openings or incorrect orifice size. Should this occur, shut the heater off and contact your installer or gas supplier.

### WATER PRESSURE SWITCH

A water pressure switch is provided in the heater to shut off the burners in the event that water supply to the heater is interrupted. It is very important to verify that the switch electrically opens and shuts off the gas valve when water flow to the heater is interrupted. Otherwise, rapid and severe damage will likely occur to the heater. (The water pressure switch should be checked and adjusted for proper operation by a qualified service person at the time of installation and periodically checked thereafter. Refer to pressure switch servicing instruction in Section 4 of this manual).

**WARNING:** *Operation of the heater without water circulation will cause rapid and severe damage to the heater.*

## SECTION 2/CAUTION

Elevated water temperature can be hazardous, and the U. S. Consumer Product Safety Commission recommends the following guidelines:

1. Spa or hot tub water temperatures should never exceed 104°F (40°C). A temperature of 100°F (38°C) is considered safe for a healthy adult. Special caution is suggested for young children.
2. Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness which could lead to unconsciousness and subsequently result in drowning.
3. **Pregnant Women Beware!** Soaking in water over 102°F (39°C) can cause fetal damage during the first three months of pregnancy resulting in the birth of a brain-damaged or deformed child. Pregnant women should stick to the 100°F (38°C) maximum rule.
4. Before entering the spa or hot tub, users should check the water temperature with an accurate thermometer; spa or hot tub thermostats may err in regulating water temperatures by as much as 4°F (2.2°C).
5. Persons with a medical history of heart disease, circulatory problems, diabetes, or blood pressure problems should obtain a physician's advice before using pools or hot tubs.
6. Persons taking medications which induce drowsiness, such as tranquilizers, antihistamines, or anti-coagulant, should not use spas or hot tubs.

## SECTION 3/MAINTENANCE AND CARE PROCEDURES

To be followed one month after start-up and then semi-annually.

1. Inspect top of heater and draft hood for soot, a sticky black substance around finned tubes and "V" baffles), and open flue gas passage ways. Any visible soot should be cleaned for proper operation.

**CAUTION:** *Soot may be combustible. Wet sooted surfaces completely prior to cleaning. Do not use steel wire brush.*

2. Clean main burners and pilot burner of dust and lint.
3. Inspect and operate all controls, gas valve and pressure relief valve.



4. Make visual check of the burner and pilot flame. Flame pattern on the main burner and pilot is indicated in the previous illustration. Yellow flame means restriction of the air openings. Lifting or blowing flame indicates high gas pressure. Low flame means low gas pressure. Should this occur, shut the heater off and contact your gas supplier or qualified service agency.
5. On indoor heaters, clean room intake openings to assure adequate flow of combustion and ventilation air.

**CAUTION:** *Combustion air must not be contaminated by corrosive chemical fumes which can damage the heater and void the warranty.*

6. Keep area around heater clear and free from combustible materials, gasoline and other flammable and corrosive vapors and liquids.

#### BASIC TIPS IF HEATER WILL NOT FIRE:

1. If you have no electrical power; it may be your "circuit breakers" have tripped. Try re-setting them.
2. If you have electrical power but the heater will not fire *check the following:*
3. The time clock must be moved to the "ON" position.
4. Your pump strainer basket may be full. If so remove debris.
5. Your filter may be dirty. If so, backwash or clean filter. (To tell if your filter is dirty, look to see if the filter pressure will be higher than usual).
6. The pump may have lost it's prime. It may be running dry, check the pressure on the filter. If there is no pressure; then you are not moving water (or your gauge is broken). Try to get the pump to run at it's normal flow rate.

#### POOL & SPA WATER CHEMISTRY

Chemical imbalance can cause severe damage to your heater and associated equipment. Maintain your water pH between 7.4 and 7.8 and total alkalinity between 100 and 150 p.p.m. If the mineral content and dissolved solids in the water become too high, scale forms inside the heat exchanger tubes, reducing heater efficiency and also damaging the heater. If the pH drops below 7.2, the heater will be severely damaged. This will result in corrosion of the heat exchanger. **Heat exchanger damage resulting from chemical imbalance is not covered by the warranty.**

#### AUTOMATIC CHLORINATORS AND CHEMICAL FEEDERS

All chemicals must be introduced and completely diluted into the pool or spa water before being circulated through the heater. Do not place chlorine tablets or bromine sticks in the skimmer. High chemical concentrations will result when the pump is not running (i.e. overnight).

Chlorinators must feed downstream of the heater and have an anti-siphoning device to prevent chemical back-up into the heater when the pump is shut off.

**NOTE:** *High chemical concentrates from feeders and chlorinators that are out of adjustment will cause very rapid corrosion to the heat exchanger. Such damage is not covered under the warranty.*

#### COLD WEATHER OPERATION

**MODERATE CLIMATE:** Heater operation can continue during short term cold spells. When temperatures are below freezing, flow (continuous pump operation) must be maintained.

**CAUTION:** *Do not use the heater to maintain water temperatures just above freezing or for freeze protection. When heater is used during freezing weather, care must be taken to avoid freeze ups. Continuous pump operation is a must. Additional protection may be required. The heater is not warranted against freeze ups.*

**COLD CLIMATE:** Prolonged operation with water temperatures below 50°F is not recommended. When starting the heater with pool temperatures below 50°F operate the heater continuously until higher temperatures are reached. Operating the heater for prolonged periods with pool water below 50°F can seriously damage the heater, and is not covered by the warranty.

For cold climate areas, please follow the winterizing procedures listed.

## WINTERIZING THE POOL & SPA HEATER

When heaters installed outdoors in freezing climate areas are to be shut down for the winter, observe the following step-by-step procedure:

1. Turn off gas valve, manual gas valve, and electrical supply to the heater.
2. Open drain plug located on the inlet/outlet header, (under water pipes). Remove the heat exchanger inspection panel on the side opposite water piping to gain access to the drain plug on the return header. Open drain plug on return header.

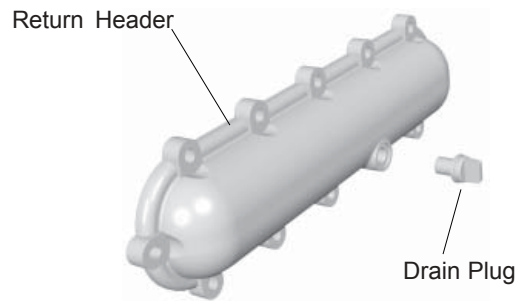


Fig. #2001

*Disconnect compression fittings from the pressure switch and return header that connects to the 1/4" copper tube and allow the tube to drain. For ASME Heaters only.*

## PART 2 - INSTALLATION/SERVICE INSTRUCTION

### SECTION 1 / RECEIVING EQUIPMENT

On receipt of your equipment it is suggested that you visually check for external damage to the carton. If the carton is damaged, a note should be made on the Bill of Lading when signing for equipment. Remove the heater from the carton and if it is damaged, report the damage to the carrier immediately. Save the carton.

These items are shipped loose inside the carton with the heater:

- | STANDARD UNIT                                       | ASME UNIT   |
|---|---|
| 1. "Pagoda" Top                                     | 1. "Pagoda" Top                                       |
| 2. 2" PVC Union with "O" rings (2)                  | 2. In/Out Flanges (2)                                 |
| 3. Plastic pipe finish flange for gas line          | 3. 1-1/2" Flange Gaskets (2)                          |
| 4. Bonding lug with mounting screw (IID units only) | 4. 2" Flange Gaskets (2)                              |
|   | 5. Flange Bolts (4)                                   |
|   | 6. Pressure Relief Valve                              |
|   | 7. 2" CPVC Adapters (2)                               |
|   | 8. Plastic pipe finish flange for gas line.           |
|   | 9. Bonding lug with mounting screw. (IID units only). |

Be sure that you receive the number of packages indicated on the Bill of Lading.

When ordering parts, you must specify model and serial number of heater. When ordering under warranty conditions, you must also specify date of installation.

Raypak recommends that this manual be reviewed thoroughly before installing your Raypak pool/spa heater. If there are any questions that this manual does not answer, please contact the factory or your local Raypak representative.

### SECTION 2 / GENERAL SPECIFICATIONS

These heaters are design certified and tested under the requirements of ANSI Z21.56 / CSA 4.7 American National Standard / CSA Standard for Gas-Fired Pool Heaters. All heaters are inter-changeable and can be used either indoor or outdoors. The appropriate top designated for that type of use is required. If desired, the top can be changed at a later date to change from outdoor to indoor or vice versa. Millivolt heater contains a self-generating electrical system operating between .25 and .75 volts.

#### Ambient Temperature Rating of Heater Components

Millivolt Heater with Honeywell Gas Valve +32°F to +175°F

Millivolt Heater with Robertshaw Gas Valve 0°F to +175°F

Electronic Ignition Heaters\* -32°F to + 175°F

\*Requires 120V or 240V Power Supply

Rated inputs suitable for up to 2000 feet elevation. For elevations above 2000 feet, reduce input 4% for each 1000 feet above sea level, as high elevation reduces combustion performance.



## SECTION 3 / INSTALLATION INSTRUCTIONS

**CALIFORNIA PROPOSITION 65 WARNING:** This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

### IMPORTANT NOTICE

These instructions are intended for the use of qualified personnel only, specifically trained and experienced in the installation of this type of heating equipment and related system components. Installation and service personnel may be required by some states to be licensed. If your state is such, be sure your contractor bears the appropriate license. Persons not qualified shall not attempt to fix this equipment nor attempt repairs according to these instructions.

### WARNING:

*Improper installation, adjustment, alteration, service or maintenance may damage the equipment, create a hazard resulting in asphyxiation, explosion or fire, and will void the warranty.*

### CODE REQUIREMENTS

**NOTE:** *The heater should not be located in an area where possible water leakage will result in damage to the area adjacent to the appliance or to the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the appliance. The pan must not restrict combustion air flow.*

Installation must be in accordance with local codes, or, in the absence of local codes, with the latest edition of the National Fuel Gas Code, ANSI Z223.1 and National Electrical Code, ANSI/NFPA 70, and for Canada, the latest edition of CAN/CGA-B149.1 and B149.2, and Canadian Electrical Code, CSA C22.1 Part 1 and Part 2.

### BASE INSTALLATION

Heater must be mounted on a level base, such as cement slab, cement blocks or other non-combustible surface. An optional non-combustible base is available for all models. An alternative method for providing a base for combustible floors is illustrated below. Heaters must **not** be installed on carpeting.

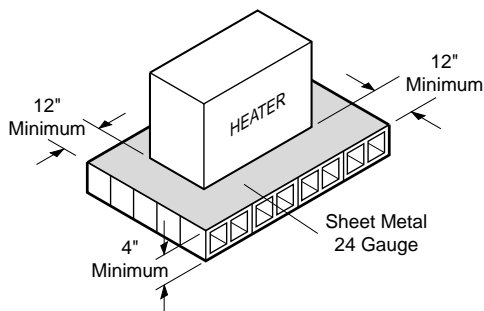


Fig. #8148.1

Utilize hollow concrete cinder blocks, align holes and leave ends open.

### CLEARANCES

#### ALL HEATERS

For clearances from combustible surfaces, see the chart below.

CLEARANCE FROM COMBUSTIBLE CONSTRUCTION	
INDOOR INSTALLATIONS:	
Top* (Draffhood) - 30"	Back - 6"
Front - Alcove	Right Side-(Water Side) 12"
Vent - 6"	Left Side-(Opposite Water side) 6"
OUTDOOR INSTALLATION:	
Top* (Stackless top or outdoor stack) - Unobstructed	
Back - 6"	
Side - 6"	

\*Clearance from top of vent terminal.

When installed according to the listed minimum clearances from combustible construction materials, the Raypak pool heaters can still be serviced without removing permanent structural construction around the heater.

However for ease of servicing, we recommend a clearance of at least 24" in the front, and at least 18" on the water connection side. This will enable the heater to be serviced in its installed location, that is, without movement or removal of the heater.

Clearances less than these (6" minimum), may require removal of the heater to service either the heat exchanger or the burner tray. In either case, the heater must be installed in a manner that will enable the heater to be serviced without removing any structure around the heater.

### OUTDOOR HEATERS

These heaters are design certified for outdoor installation, when equipped with the approved tops designated for outdoor use.

**WARNING:** The heater shall not be located in an area where water sprinklers, or other devices, may cause water to spray through the cabinet louvers and into the heater. This could cause internal rusting or damage some electrical components, and this would void the warranty.

**WARNING:** Do not install within 3 feet of a heat pump or an outdoor condensing unit. Strong air intake from these equipment can disturb the combustion process and cause damage or personal injury.

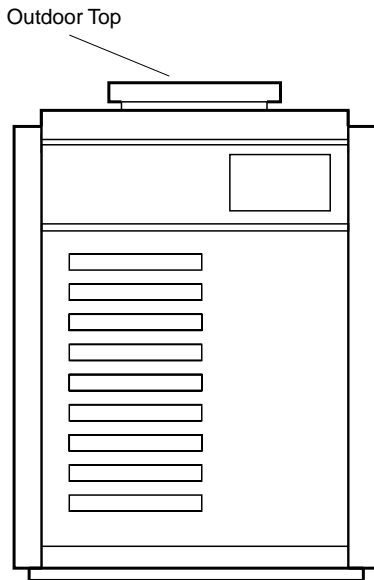
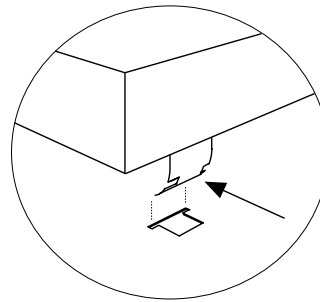


Fig. # 8278.1

1. Insert tabs into keyhole (4 places).



Pagoda Top  
(Shipped  
Loose with  
Heater)

2. Snap tabs into keyholes so as not to pull out.

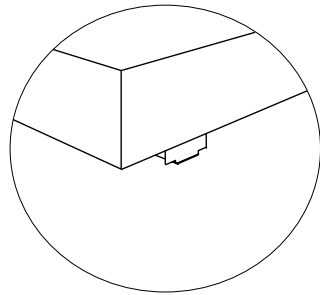
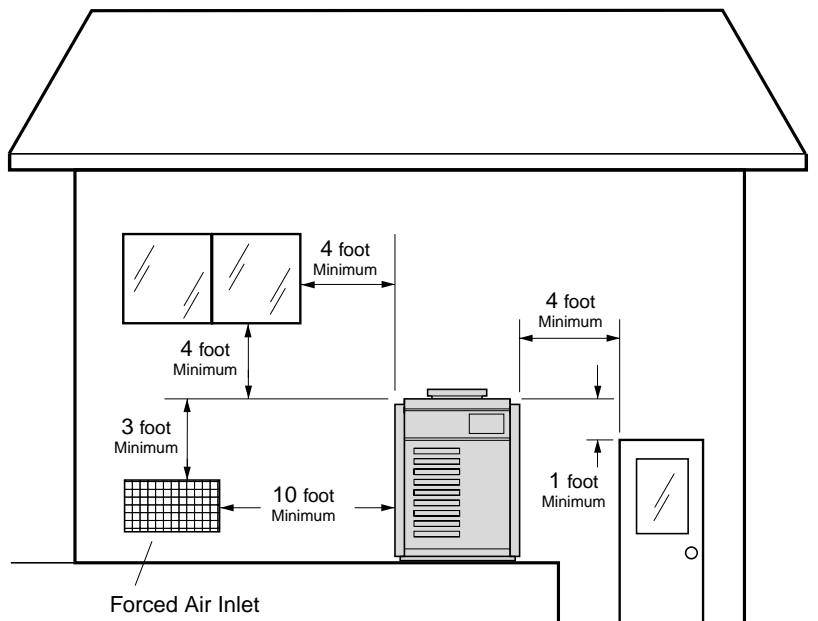


Fig. #RP8280.1

Heaters must not be installed under an overhang of less than three (3) feet from the top of the heater. Three (3) sides must be open in the area under the overhang. Roof water drainage must be diverted away from the heaters installed under overhangs with the use of gutters.

**For U.S. installations**, the point from where the flue products exit the heater must be a minimum of four (4) feet below, four (4) feet horizontally from, or one (1) foot above any door, window or gravity inlet into any building. The top surface of the heater shall be at least three (3) feet above any forced air inlet, or intake ducts located within ten (10) feet horizontally.

**For installations in Canada**, pool heaters shall not be installed with the top of the vent assembly within 10 feet below, or to either side, of any opening into the building. Refer to the latest revisions of CAN/CGA-B149.1 and B149.2.



**U.S. Installations only**

Fig# 8245.1

## INDOOR HEATER

The design is also certified for indoor installation when equipped with the approved draft hood.

**For Canada**, indoor installation is restricted to an enclosure that is not occupied and does not directly communicate with occupied area. Refer to the latest edition of CAN/CGA-B149.1 and B149.2 for specific requirements.

Locate heater as close as practical to a chimney or gas vent. Heater must always be vented to the outside. See Vent Piping Section for venting details. Minimum allowable space is shown on the nameplate.

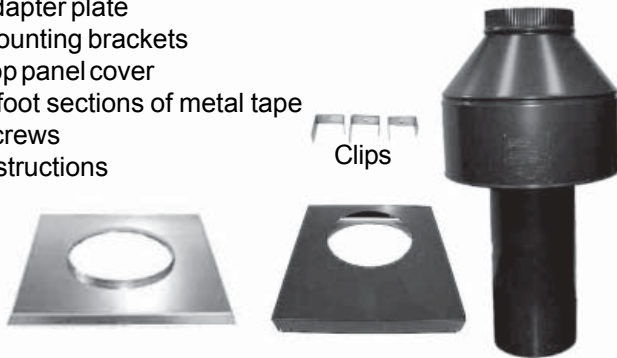
### **WARNING:**

Indoor boilers require a draft hood that must be connected to a vent pipe and properly vented to the outside. Failure to follow this procedure can cause fire or fatal carbon monoxide poisoning.

## OUTDOOR STACK / INDOOR STACK INSTALLATION

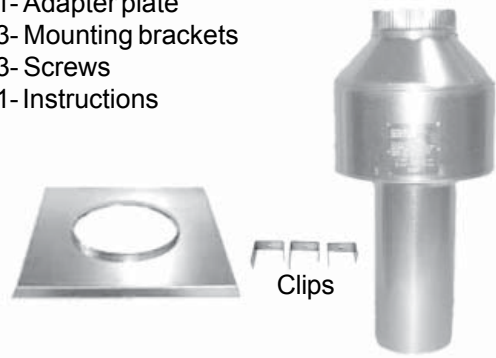
### **OUTDOOR KIT INCLUDES:**

- 1- Draft hood, painted
- 1- Adapter plate
- 3- Mounting brackets
- 1- Top panel cover
- 2- 1 foot sections of metal tape
- 3- Screws
- 1- Instructions



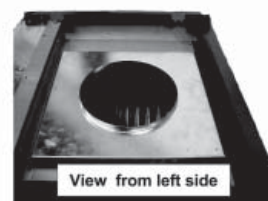
### **INDOOR KIT INCLUDES:**

- 1- Draft hood, unpainted
- 1- Adapter plate
- 3- Mounting brackets
- 3- Screws
- 1- Instructions



## **INSTRUCTIONS:**

1. Make sure that the gas and electric has been turned off to the unit.
2. Remove the "pagoda" top from the louvered top and discard. See **Fig. 3**.
3. Remove the louvered top and set aside, saving the four phillips screws for re-assembly. See **Fig. 3**.
4. Remove and discard the rain shield. See **Fig. 4**.
5. Install adapter plate on top of heater flue collector. See **Fig. 5**.
6. Re-install louvered top on heater and fasten with Phillips screws set aside in step 3.



### **Securing the top panel cover- INDOOR KIT ONLY**

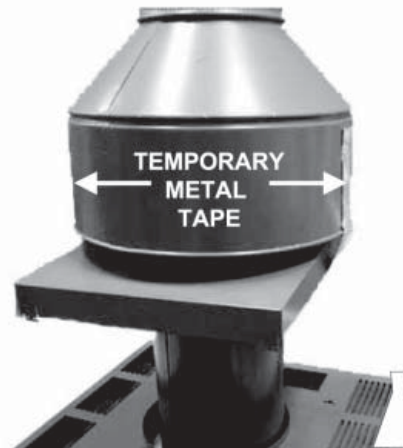
7. Re-install the louvered top.
8. Mount the draft hood onto the adapter plate lip inside the heater. See **Fig. 6**.
9. Proceed to installing the clips, step 14.



**FIG. 6**

### **Securing the top panel cover- OUTDOOR KIT ONLY**

10. After removing the draft hood from the box, slide the top panel cover over the draft hood. See **Fig. 1**.
11. Holding both pieces together, mount the draft hood on the adapter plate lip inside the heater. See **Fig. 6**.
12. Take the two pieces of metal tape and attach to each side of the draft hood leaving 6" hanging down.
13. Slide the top panel cover up and attach the metal tape to the underneath side. This is to temporarily keep the top panel cover out of the way while you are attaching the clips as shown in the next steps. See **Fig. 7**.



**FIG. 7**

### **Installing the clips: INDOOR & OUTDOOR KITS**

14. Notice that there are three pilot holes above the base of the draft hood as shown in **Fig. 8**. These are the locations where the three clips are to be attached.
15. Insert the long edge of one clip between the top panel cover and the draft hood, see **Fig. 9**.
16. With a twisting motion, rotate the clip up, see **Fig. 10**.
17. Pull up on clip, see **Fig. 11**.
18. Hold the clip up and align the clip hole to the pilot hole, see **Fig. 12**.
19. Insert screw into hole and secure using a 5/16" nut driver.
20. Repeat steps 6-10 using remaining two clips.
21. This completes the indoor draft hood installation. If installing an outdoor draft hood, proceed to step 13.



**FIG. 8**



**FIG. 9**



**FIG. 10**



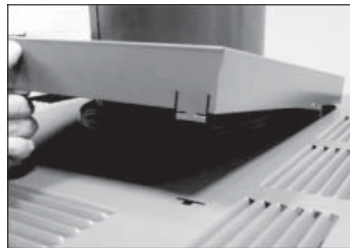
**FIG. 11**



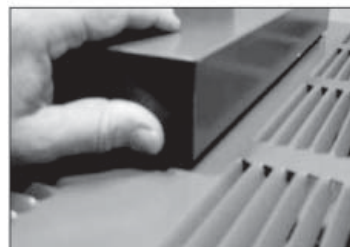
**FIG. 12**

### **Installing the top cover- OUTDOOR KIT ONLY**

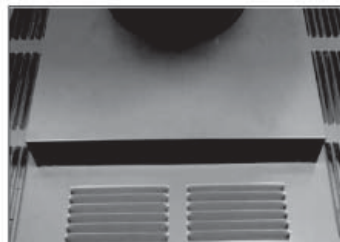
22. Remove the two pieces of metal tape holding the top panel cover up and discard.
23. Insert the rear two tabs into the slots on the heater top and slide the top panel cover backwards. See **Fig. 13**.
24. Lower the top panel cover and using your thumbs, push tabs in and insert the two front tabs into the slots on the top of the heater. See **Fig. 14**.
25. Lower the top panel cover flush to the top and release the tabs. They will spring into place as shown in **Fig. 15**.
26. Turn the gas and electric heater on.



**FIG. 13**



**FIG. 14**



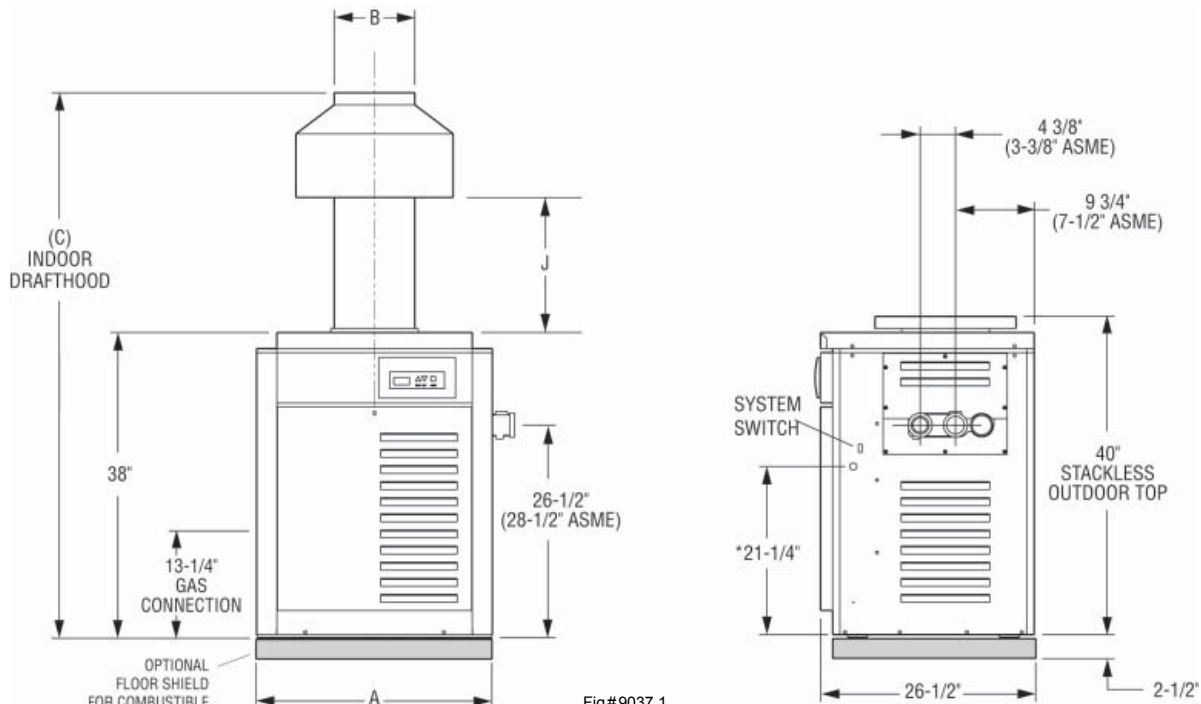
**FIG. 15**

## SPECIFICATIONS AND DIMENSIONS

Heater Model*	BTU Input (000)	(A) Cabinet Width	(B) Flu Dia.	(C) Indoor Drafthood	(J)	Gas Conn.	Water Conn.	Shipping Weights (lbs)		
								Cast Iron Heater w/Stackless Top	Capron Heater w/Stackless Top	Indoor Draft Hood
R185A	181	18-1/4"	6"	62-5/8"	12-1/16"	3/4"	2"	191	172	12
R265A	264	22-3/8"	7"	62-7/8"	11-1/8"	3/4"	2"	214	195	15
R335A	334	25-3/4"	8"	63-3/4"	10-3/4"	3/4"	2"	234	215	17
R405A	399	29-1/4"	9"	65-3/8"	12-1/2"	3/4"	2"	253	234	20

\*Designation for Propane is "EP", Natural gas is "EN". Prefix "C" is for Cast Iron (ASME) Headers; "P" is for Plastic (Capron) Headers. Reduce input 4% for each 1000 ft. above sea level when installed above 2000 ft. elevation. **For Canada**, no derate is required for elevations up to 4500 feet. Manufactured under Patent No. 3,623,458.

**Note:** Plastic (Capron) Headers cannot be used for ASME installations.



\*Electrical Connection On Left Side is 19-1/8".

### COMBUSTION AIR (Indoor Units Only)

Air For Combustion And Ventilation  
(Indoor Units Only)

The heater must have both combustion and ventilation air. Minimum requirements for net free air supply openings, one 12 inches from ceiling for ventilation and one 12 inches from the floor for combustion air as outlined in the latest edition of the National Fuel Gas Code, ANSI Z2231(Canada-CAN/CGA-B149.1 and B149.2) and any local codes that may have jurisdiction.

**CAUTION:** Combustion air must not be contaminated by corrosive chemical fumes which can damage the heater and void the warranty.

- a. All Air From Inside The Building:  
Each opening shall have a minimum net free square inches as noted:

Model	Square Inches	Model	Square Inches
185	181	335	333
265	264	405	399

- b. All Air From Outdoors:  
When air is supplied directly from outside of building, each opening shall have a minimum net free square inches as noted:

Model	Square Inches
185	46
265	66
335	84
405	100



## VENT PIPING

### **WARNING:**

Indoor boilers require a draft hood that must be connected to a vent pipe and properly vented to the outside. Failure to follow this procedure can cause fire or fatal carbon monoxide poisoning.

Vent piping the same size as the draft hood outlet is recommended, however, when the total vent height is at least ten (10) feet (draft hood relief opening to vent terminal), the vent pipe size may be reduced as specified in Chapter 10 of the National Fuel Gas Code, **ANSI Z 223.1. (Canada-CAN/CGA-B149.1 and B149.2)** As much as possible avoid long horizontal runs of vent pipe and too many elbows. If installation requires horizontal non-vertical runs, the vent pipe must have a minimum of 1/4 inch per foot rise and should be supported at not more than five foot intervals. Plumbers tape, criss-crossed, will serve to space both horizontal and vertical piping. Gas vents supported only by the flashing and extending above the roof more than five feet should be securely guyed or braced to withstand snow and wind loads. We recommend use of insulated vent pipe spacer through the roofs and walls. Another option for installation that requires horizontal runs is using the D-2 powervent kit option. The powervent is certified for category III venting up to 40 ft. equivalent 4" diameter venting.

For protection against rain or blockage by snow, the vent pipe must terminate with a vent cap which complies with the local codes or, in the absence of such codes, to the latest edition of the National Fuel Gas Code, **ANSI Z223.1. (Canada-CAN/CGA-B149.1 and B149.2)**

The discharge opening must be a minimum of two feet vertically from the roof surface and at least two feet higher than any part of the building within ten feet. Vent stack shall be at least five feet in vertical height above the draft hood outlet. The vent cap location shall have a minimum clearance of 4 feet horizontally from, and in no case below, unless a 4-foot horizontal distance is maintained, from electric meters, gas meters regulators and relief equipment.

The weight of the vent stack or chimney must not rest on heater draft hood. Support must be provided in compliance with applicable codes. The heater top and draft hood must be readily removable for maintenance and inspection. Vent pipe should be adequately supported to maintain proper clearances from combustible construction.

Type "B" double wall or equivalent vent pipe is recommended. However single wall metal vent pipe may be used as specified in the latest edition of the National Flue Gas Code **ANSI Z 223.1. (Canada-CAN/CGA-B149.1 and B149.2)**

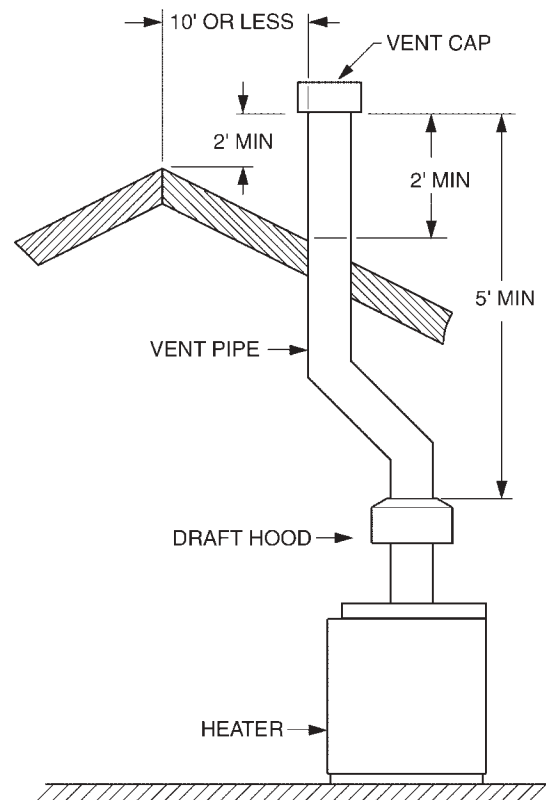


Fig. #RP8119.2

## GAS SUPPLY CONNECTIONS

Gas piping must have a sediment trap ahead of the heater gas controls, and a manual shut-off valve located outside the heater jacket. All gas piping should be tested after installation in accordance with local codes.

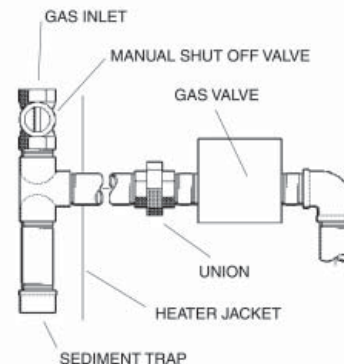




Fig. #8090.0

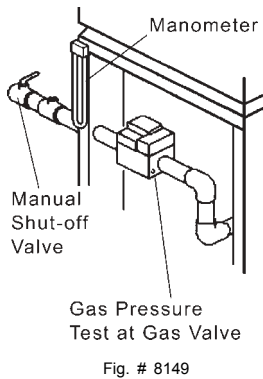
**CAUTION:** The heater and its manual shut off valve must be disconnected from the gas supply during any pressure testing of that system at test pressures in excess of 1/2 psig (3.45 KPA). Dissipate test pressure in the gas supply line before reconnecting the heater and its manual shut off valve to gas supply line. **FAILURE TO FOLLOW THIS PROCEDURE MAY DAMAGE THE GAS VALVE. OVER PRESSURED GAS VALVES ARE NOT COVERED BY WARRANTY.** The heater and its gas connections shall be leak tested before placing the appliance in operation. Use soapy water for leak test. **DO NOT** use open flame.

**NOTE:** Do not use teflon tape on gas line pipe thread. A flexible sealant is recommended.

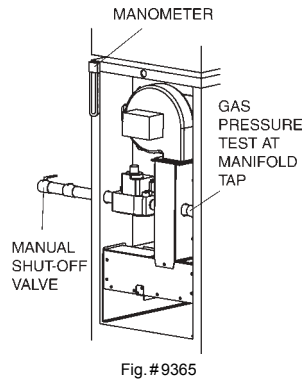
A minimum of 7" W.C. and a maximum of 14" W.C. upstream pressure under load, and no load conditions must be provided for natural gas or a minimum of 12" W.C. and a maximum of 14" for propane gas.

**GAS PRESSURE REGULATOR**

The gas pressure regulator is preset at 4" W. C. for natural gas, and 11" W. C. for propane gas. The pressure at the gas valve, taken with a manometer, should be about 3.7" W. C. natural gas (3.9" W.C. for Low NOx) and 10.5" W. C. propane gas. If an adjustment is needed, remove seal and turn adjustment screw clockwise  to increase pressure or counter-clockwise  to decrease pressure.



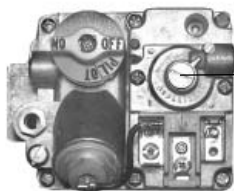
ATMOSPHERIC



LOW NOx

**GAS PRESSURE ADJUSTMENT LOCATIONS**

**MILLIVOLT GAS VALVES**



Gas Pressure Adjustment

Fig # 9263

Robertshaw 7000  
Models 185 thru 405

**ELECTRONIC IGNITION GAS VALVES**

Gas Pressure Adjustment



Fig # 9264

Honeywell VR8304  
Models 185 thru 405

**ELECTRONIC IGNITION GAS VALVES-CONTINUED**

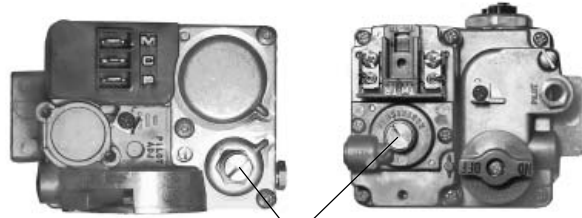


Fig # 9328

Fig # 9329

Gas Pressure Adjustment

Robertshaw 7200  
Model 185

Robertshaw 7000 BDER  
Model 265-335



Fig # 9327

Gas Pressure Adjustment

Robertshaw 7000 DERHC  
Model 405

**PIPE SIZING FOR GAS CONNECTIONS**

MAXIMUM EQUIVALENT PIPE LENGTH

Natural Gas 1000 BTU/FT <sup>3</sup> .60 Specific Gravity @ 0.5" WC Pressure Drop											
Propane Gas 2500 BTU/FT <sup>3</sup> 1.53 Specific Gravity @ 0.5" WC Pressure Drop											
	1/2"		3/4"		1"		1-1/4"		1-1/2"		
Model	N	P	N	P	N	P	N	P	N	P	
185A	-	15	30	65	95	250	400	-	-	-	
265A	-	10	20	40	60	140	250	560	-	-	
335A	-	-	15	25	35	85	150	380	360	-	
405A	-	-	-	15	25	60	100	260	250	-	

Low NOx units are not available in propane.

**PLUMBING FOR WATER CONNECTIONS**

**LOCATION**

The RP 2100 heater requires water flow and positive pressure to fire and operate properly. It must therefore be installed downstream of the discharge side of the filter pump. A typical installation is plumbed as follows:

1. The inlet side of the filter is plumbed directly to the discharge side of the filter pump;
2. The outlet side of the filter is then plumbed to the inlet of the heater; and
3. The outlet of the heater is plumbed to the return line to the pool or spa. The pump, filter and heater are thus plumbed in series.

Plumbing from the heater back to the pool must not have any valves or restriction that could prevent flow when the pump is operating.

**CAUTION:** An additional source of heated water, i.e. a solar system, must be connected to the main line ahead of the heater inlet pipe in order for it to act as the primary heat source. If the primary system provides adequate heat to maintain setpoint, the RP2100 heater will not fire. Be advised that the RP2100 control panel will then display sensed water temperatures downstream of the primary heating system, rather than the temperature of the water exiting the pool.

Heater must be located so that any water leaks will not damage the structure of adjacent area. PVC pipe may be glued directly into header unions.

**FLOW RATES**

MODEL	PIPE SIZE	MIN.GPM	*MAX.GPM
185	1-1/4"-1-1/2" - 2	20	125
265	1-1/4"-1-1/2" - 2	25	125
335	1-1/4"-1-1/2" - 2	35	125
405	1-1/4"-1-1/2" - 2	40	125

\*When flow rates exceed maximum GPM an external auxiliary bypass valve is required. See external bypass valve section for details.

**CONNECTIONS (PLASTIC HEADER)**

Before attaching the 2-inch unions to the inlet/outlet header, make sure the o-rings are properly seated in the grooves. Use AquaLube or equivalent non-petroleum based lubricant on the o-ring. Tighten the unions hand tight. Glue PVC piping directly to the unions.

**INLET/OUTLET HEADER**

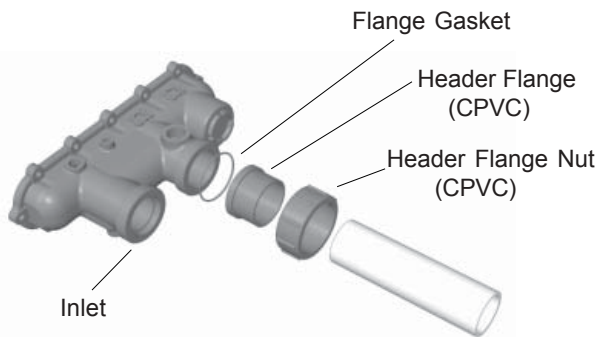
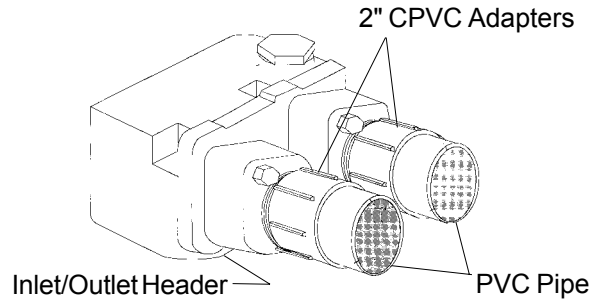


Fig. #2002.1

High temperature CPVC Header Flanges and header Flange Nuts are provided. If there is any possibility of back-siphoning when the pump stops, it is suggested that a check valve (or valves) also be installed in the system.

**COMPANION FLANGE CONNECTIONS (CASTIRON HEADER)**

Heater must be located so that any water leaks will not damage the structure of adjacent area. High temperature 2" plastic pipe (CPVC) may be threaded directly into the header flanges. This is not the same as the Schedule 80 PVC pipe which is also colored gray. PVC may be used immediately after the CPVC adapters.

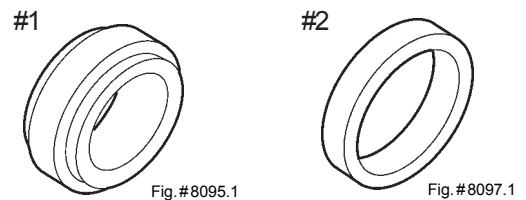


**CAUTION:** NEVER install PVC directly into header flanges. Use the 2" CPVC adapter supplied loose with the heater.

**DO NOT** use petroleum base assembly fluids (such as Petroleum Jelly or lubricating oil). If assembly lube is required, use a silicon base such as Amoral etc.

There are two sets of flange gaskets supplied with your heater. Use the appropriate gaskets for all your heater connections. Discard unused set.

**GASKET DESIGN #1:** Accepts 1-1/2" copper tube or 1-1/4" galvanized pipe as a slip connection.  
**GASKET DESIGN #2:** Accepts 2" copper tube as a slip connection. The flange is threaded for 2" screw in pipe connections. Also used with the 2" CPVC adapters.



**INLET/OUTLET HEADER**

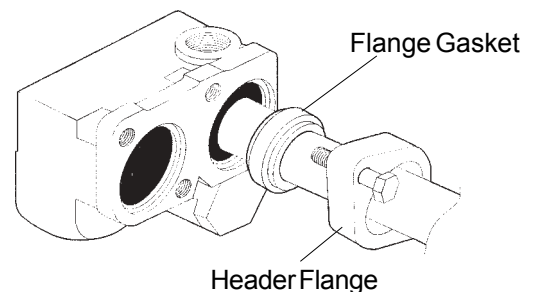


Fig. #8093.1

## UNITHERM GOVERNOR OPERATION

### CAUTION:

The patented Unitherm Governor is a thermostatic mixing valve specifically designed to maintain constant heater internal temperature between 105° to 115°F despite continually changing flow rates from the filter and changing pool temperatures. This narrow range is needed to prevent damaging condensation on the burners which will occur if the heater runs for any length of time below 100°F. It is also needed to inhibit scale formation in the tubes by maintaining temperatures well below accelerated scaling temperatures.

### INTERNAL AUTOMATIC BY-PASS VALVE

In addition to the Unitherm Governor, a built-in automatic by-pass valve is provided in the in/out header. While the Unitherm Governor responds to the changes in water temperature in the heater, the internal by-pass valve automatically responds to changes in water pressure in the piping system. Proper amount of water flow is maintained through the heater under varying pressures dictated by the conditions of the pump and filter.



Fig.#2003

### EXTERNAL AUXILIARY BYPASS VALVE (Where Required)

An auxiliary bypass valve should be used when flow rates exceed 125 GPM (usually a high performance pump size larger than two horsepower will exceed this flow rate). This valve is required to complement the function of the automatic bypass valve, particularly when starting the heater in winter or early spring when the spa or pool temperature is down below 50°F. It also serves to eliminate needless pressure drop through the heater and accompanying reduction in the flow rate to the spa jets, etc.

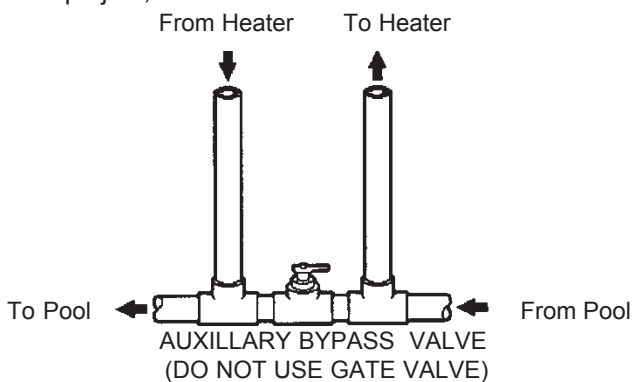


Fig. #8150.0ss

## AUXILIARY BYPASS VALVE ADJUSTMENT

To set bypass: With clean filter, adjustment is made by feeling the inlet and outlet pipes at the heater. Outlet pipes should be slightly warmer than inlet and comfortable to the touch. If pipe is hot, close bypass; if cold, open bypass.

### PRESSURE RELIEF VALVE INSTALLATION

To conform to local building codes, it may be necessary to install a pressure relief valve. A 3/4" pressure relief valve having a capacity equal to BTU/HR output of the model to be installed is recommended for this heater. The maximum acceptable pressure relief valve setting is 125 psi.

A 3/4" NPT connection is provided in the plastic header for installation of a pressure relief valve. The valve shall be installed in a vertical position. Do not over tighten. Install pressure relief valve hand tight plus 1/2 turn.

#### PLASTIC HEADER

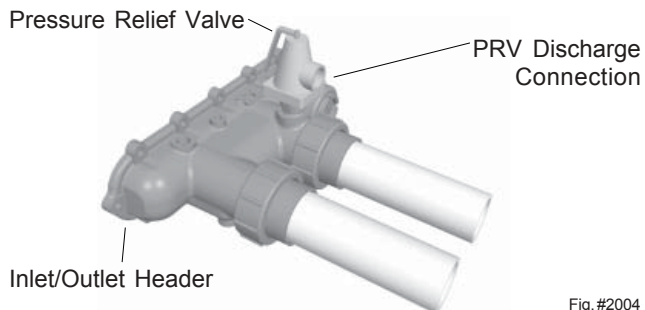


Fig. #2004

A 3/4" NPT connection is provided in the header for installation of a pressure relief valve. The valve shall be installed in a vertical position.

#### CAST IRON HEADER

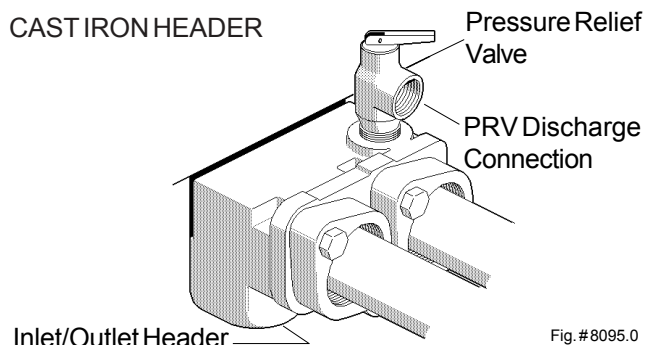


Fig. #8095.0

**NOTE:** To avoid water damage or scalding due to valve operation, drain pipe must be connected to valve outlet and run to a safe place of discharge. Drain pipe must be the same size as the valve discharge connection throughout its entire length and must pitch downward from the valve. No shutoff valve shall be installed between the relief valve and the drain line. Valve lever should be tripped at least once a year to ensure that waterways are clear.



## RP2100+ Heat Exchanger Reversal Procedure (Capron Resin Header Models)

1. Remove right and left side access panels (**Figure 1**).
2. Disconnect wires at high limit, AGS (automatic gas shutoff), and pressure switch on the inlet/outlet header (**Figure 2**).
3. **Electronic Ignition Heaters:** Remove the thermostat temperature sensor by loosening the compression-fitting nut (**Figure 3**). Reroute the sensor to the left side of the heater.
4. **Millivolt Heaters:** Remove the temperature sensor bulb and retainer clip from the sensor well (**Figure 4**). Reroute the sensor bulb to the left side of the heater.
5. Remove (12) bolts holding the inlet/outlet and return headers to the tube sheets. Clean off tube sheet area where the gasket seats. Also clean off the header and the gasket. Apply a non-petroleum based lubricant to the gasket such as Aqua Lube. Reattach the headers to the opposite sides, making sure they are installed in an upright position (**Figure 5**). **Do not over tighten.** Torque should not exceed 7 ft/lbs.
6. Reconnect high limit, AGS, and pressure switch wires.
7. **Electronic Ignition Heaters:** Insert the temperature sensor in the compression fitting and tighten 1/2 turn past hand tight.
8. **Millivolt Heaters:** Insert sensor bulb and retainer clip into sensor well.
9. Allow for water flow through the heater and check for leaks.
10. Reattach access panels to the opposite sides.

*For ASME Models call your factory representative.*



ACCESS PANEL

Fig. #1

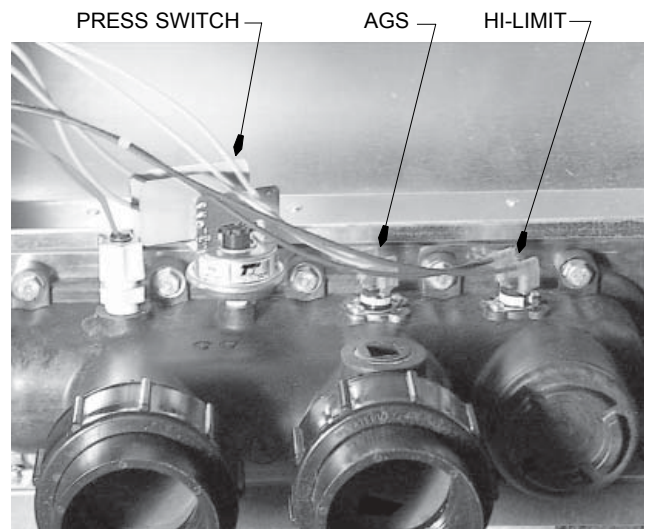


Fig. #2

JACO FITTING

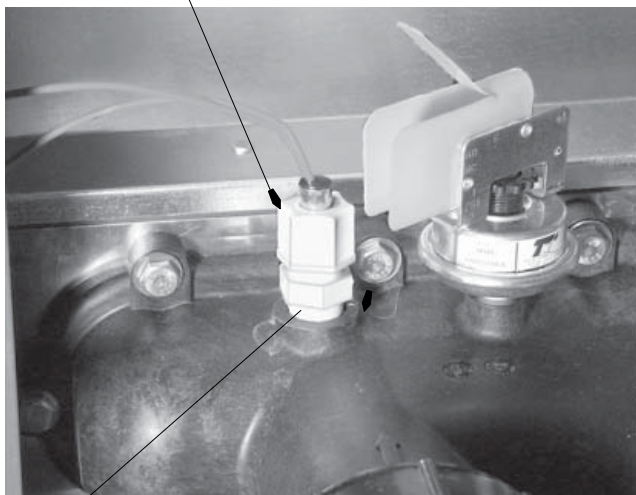


Fig. #3

NOTE: Tighten almost flushed (1/32" to 1/8") to the header to avoid leaks.

BULB & CLIP

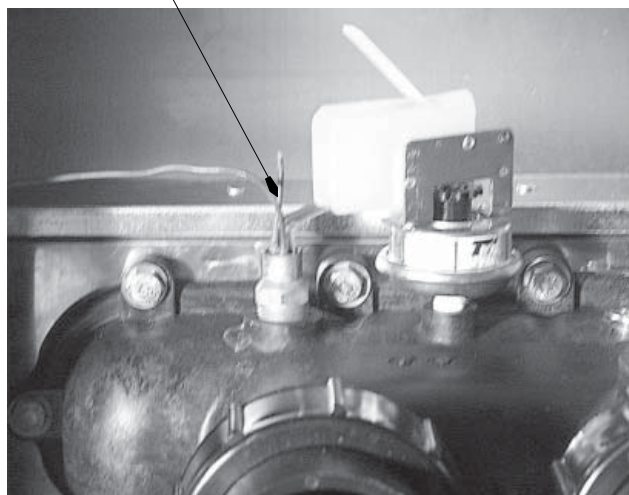


Fig. #4

RE-INSTALLED IN/OUT HEADER ON OPPOSITE SIDE.

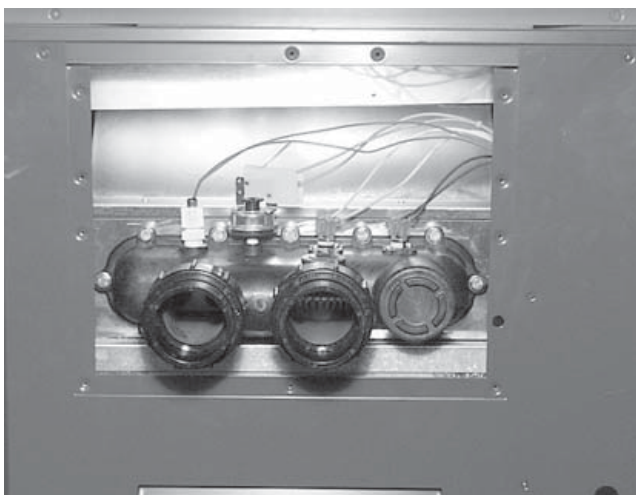


Fig. #5



## ELECTRICAL WIRING

**NOTE:** If it is necessary to replace any of the original wiring, it must be replaced with 105° C wire or its equivalent, and /or 150° C wire or its equivalent as originally built.

### MILLIVOLT SYSTEM

The Millivolt System residential heater is equipped with a self-generating electrical system in which the electric current is provided by means of a pilot generator. No external electrical connections are required.

When installing a remote switch, do not exceed 10 feet of wiring from the heater. Use 18 gage stranded wire.

### ELECTRONIC INTERMITTENT IGNITION DEVICE SYSTEM (IID)

**NOTE:** Heaters are factory wired for 240V power supply.

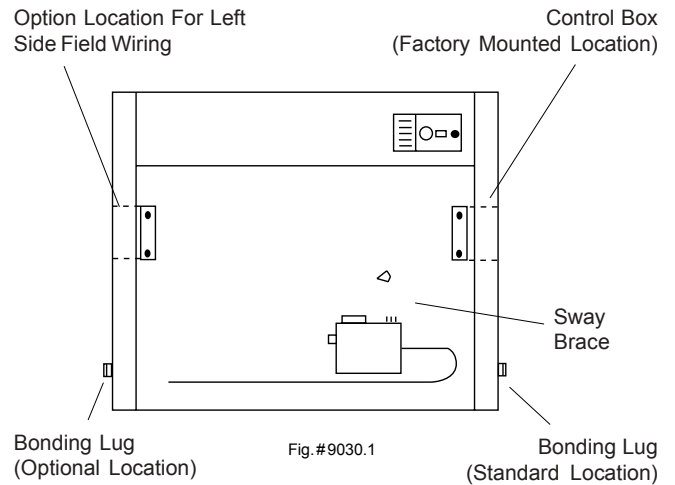
The standard field wiring connection is on the right side of the heater.

To wire the heater from the left side, follow the steps below:

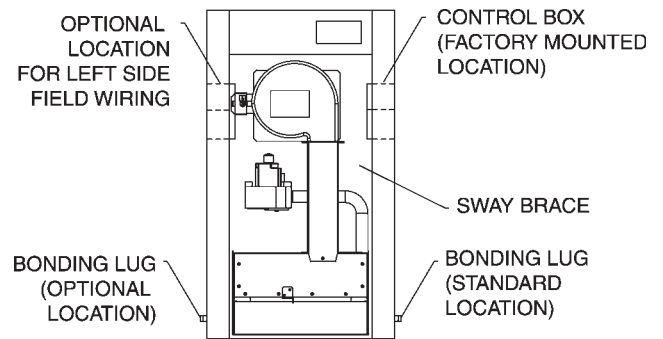
1. Remove the two (2) screws that hold down the junction box to the sway brace. Untie excess yellow wires located behind the junction box.
2. Move the junction box to the left side of unit and attach the box to the sway brace.
3. Secure 24V yellow wires to sway brace panel with existing wire retainers.
4. Connect the wires inside the junction box, either 120V or 240V depending on the field wiring.

**NOTE:** 7/8" Dia. holes not utilized on jacket and control box can be used for fireman switch or auxiliary control interface wiring.

**NOTE:** Heater must be electrically grounded and bonded. Bonding lug is provided loose with the unit. Install bonding lug on lower right or left side of jacket as necessary for bonding the unit. Mounting hole is provided on the jacket.



### ATMOSPHERIC



### LOW NOx

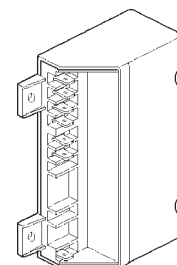
The *Electronic Intermittent Ignition Device* automatically lights the pilot and main burners upon a call for the heat. The heater is supplied with a dual voltage transformer for 120V or 240V input power hookup.

**NOTE:** IID Propane Units and IID Low NOx natural gas units only

Heater is equipped with an electronic ignition device with a 100% safety lockout feature. If the heater fails to start or lockout, reset the ignition device by interrupting the power to the heater for 60 seconds.

Caution: If service replacement of the electronic ignition device is required, replace only with a 100% safety lockout device with 90 second trial for pilot ignition.

### HONEYWELL IGNITION CONTROL



For 120 V input power to the unit, connect the black wire to the "L1" or hot leg of the power supply. Connect the white wire to the "L2" or neutral leg of the power supply. Attach the wire nut to the red wire. There should be no connection to the red wire for 120V operation. For Low NOx pool heaters wire nut each red wire independently.

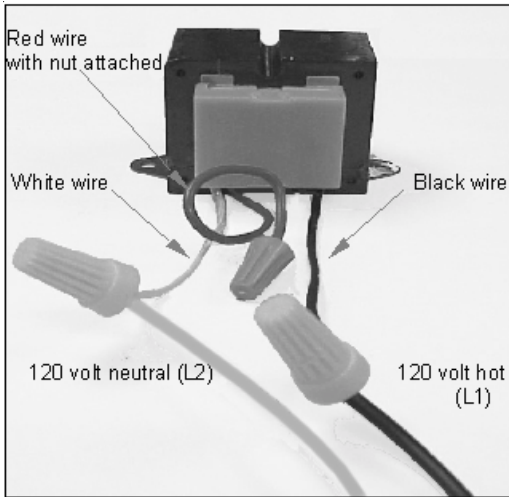


Fig. #9240

For 240 V input power to the unit, connect the black wire to the "L1" or hot leg of the power supply. Connect the red wire to the "L2" or second hot leg of the power supply. Attach the wire nut to the white wire. There should be no connection to the white wire for 240V operation. For Low NOx pool heaters wire nut each white wire independently.

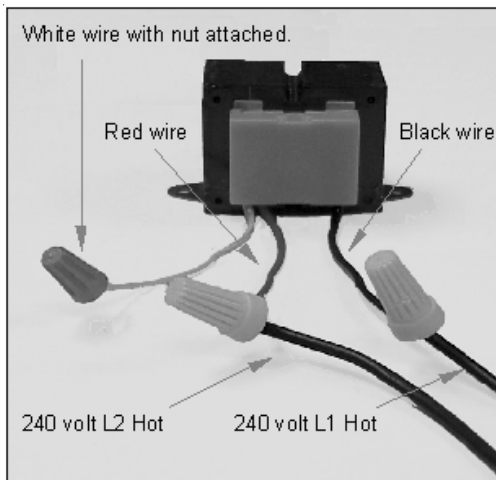
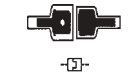


Fig. # 9241

Heater must be electrically grounded and bonded in accordance with local codes, or, in the absence of local codes, with the latest edition of the National Electrical code, ANSI/NFPA 70. (Canada- Canadian Electrical Code, CSA C22.1, Part 1 and Part 2.)

## WIRING DIAGRAM KEY

PINK CONNECTOR BLUE CONNECTOR



KEY	
—	120V
---	24 V 105°
---	24 V 150°

BK	- BLACK
B	- BLUE
BR	- BROWN
G	- GREEN
O	- ORANGE
R	- RED
V	- VIOLET
W	- WHITE
Y	- YELLOW

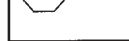


Fig. #RP8096

## WIRING DIAGRAM MILLIVOLT UNITS WITH MECHANICAL THERMOSTAT

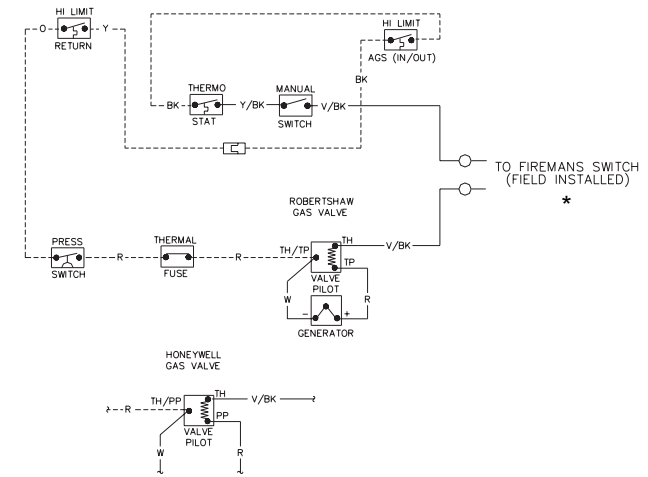
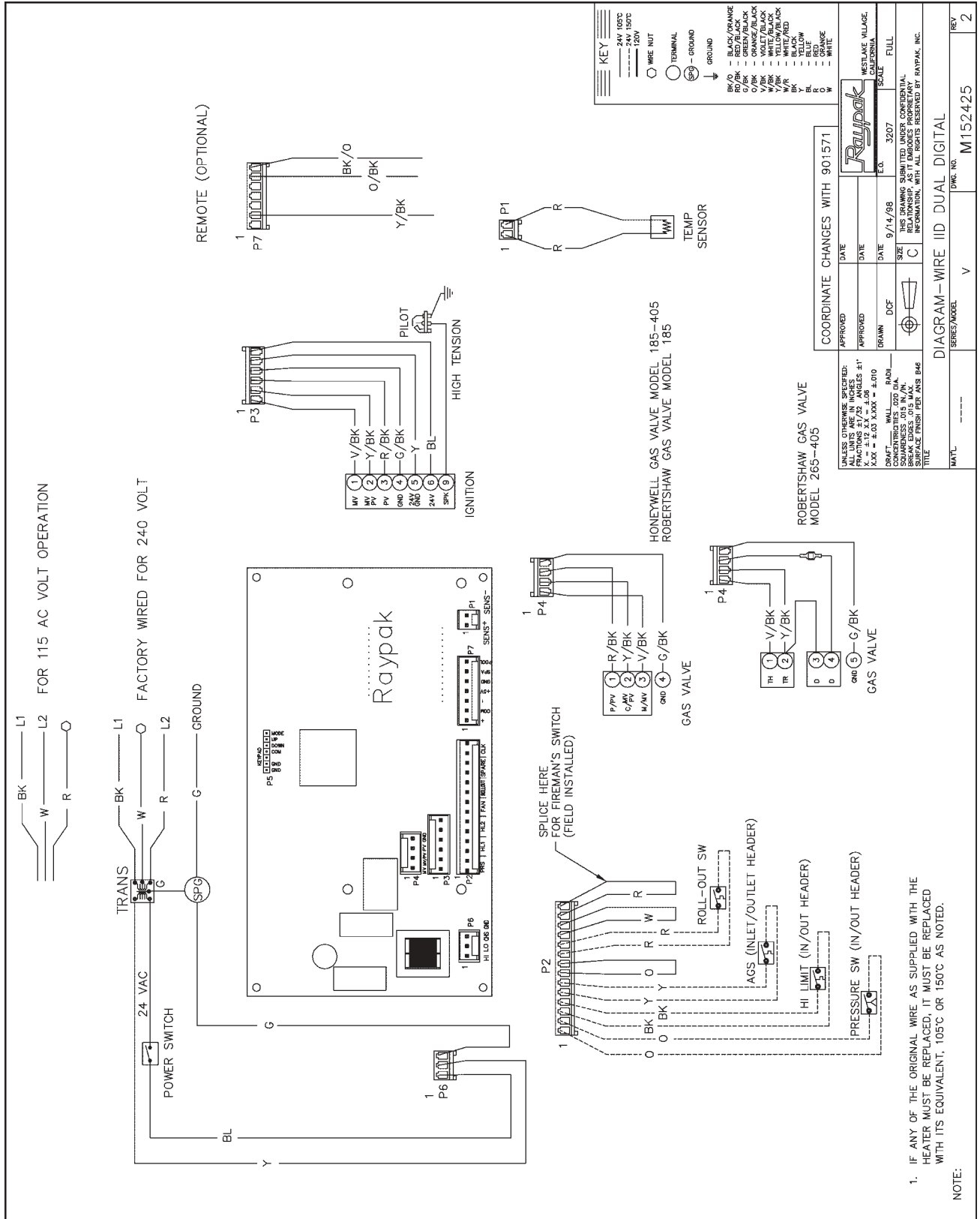


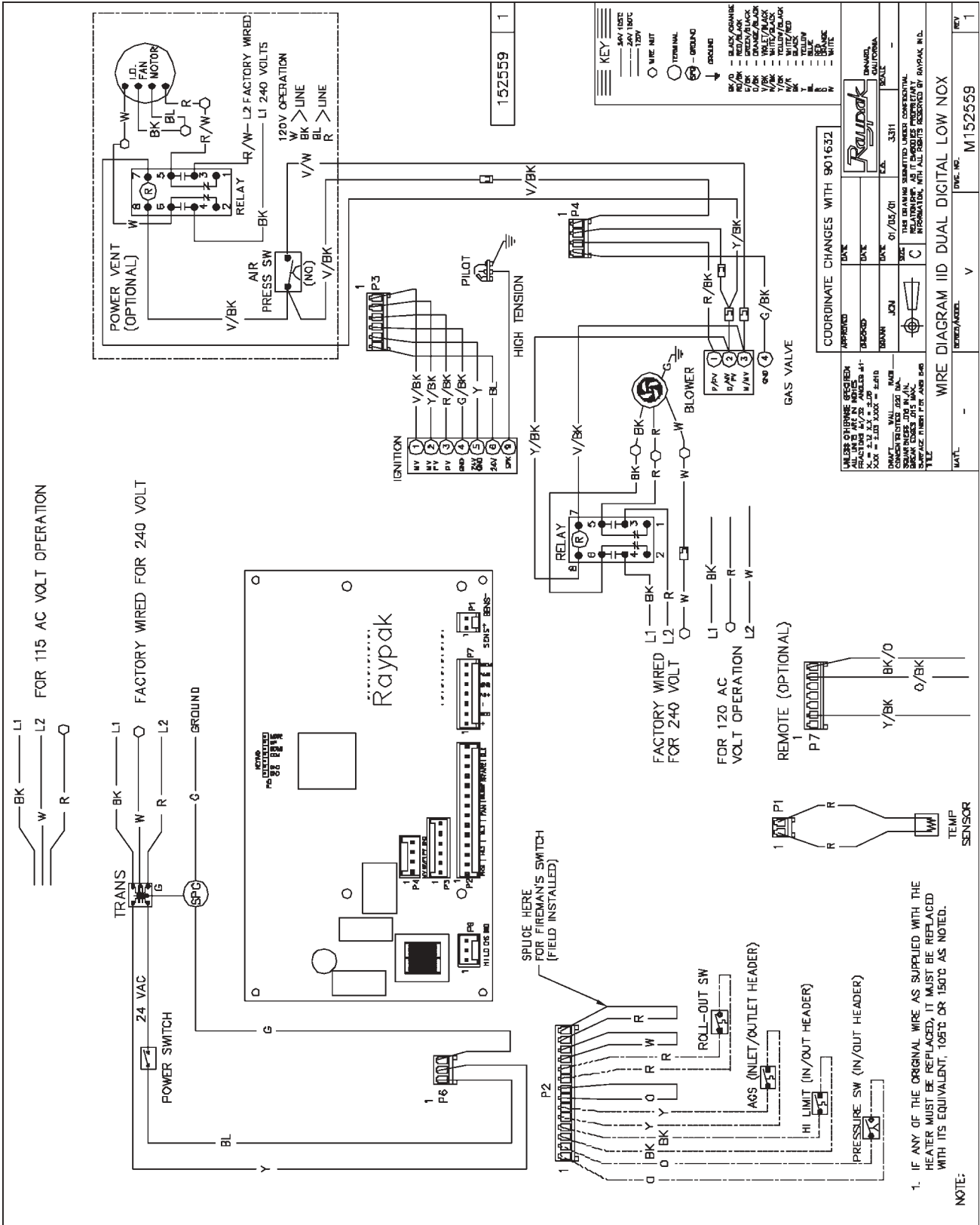
Fig. #2353

**NOTE:** Input power to the heater (120/240V) can be supplied from the load (pump) side of time clock or directly from the switch/GFCI power source. It is preferred to make connection to the load/pump side of the time clock. When using the switched GFCI power source the heater could display false service indicators on the delay panel if the pump is turned off.

# WIRING DIAGRAM - IID UNITS (atmospheric)



# WIRING DIAGRAM - IID UNITS (Low NOx)



1. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE HEATER MUST BE REPLACED, IT MUST BE REPLACED WITH ITS EQUIVALENT, 105°C OR 150°C AS NOTED.

NOTE:

## SECTION 4 / SERVICING INSTRUCTIONS

### GENERAL LOCATION OF CONTROLS

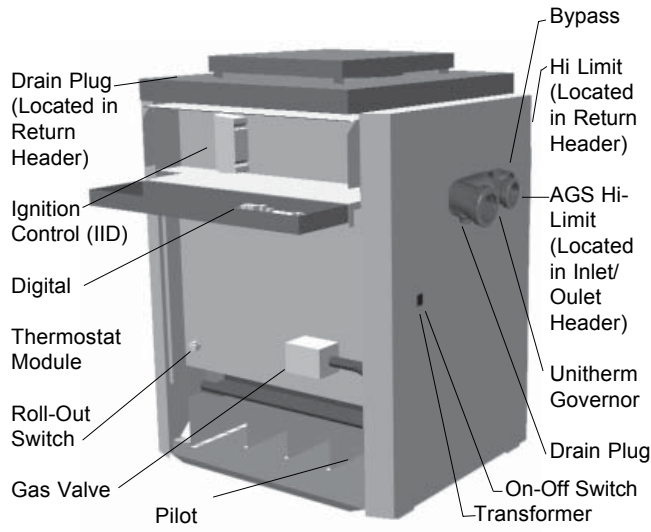


Fig #2005

### CONTROL PANEL REMOVAL

1. Remove (4) screws from sides of control panel.
2. Rotate control panel down until panel stops. Do not force.

**NOTE:** Caution must be taken not to damage controls or wiring.

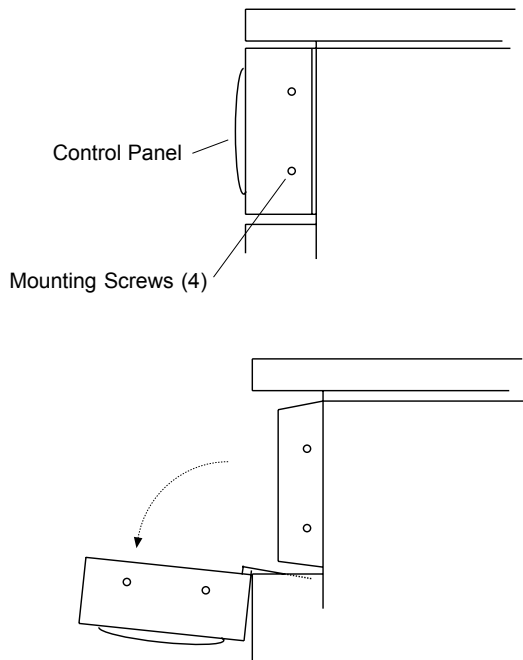


Fig. #RP 8267

### CONTROLS/ADJUSTMENTS/REPLACEMENTS

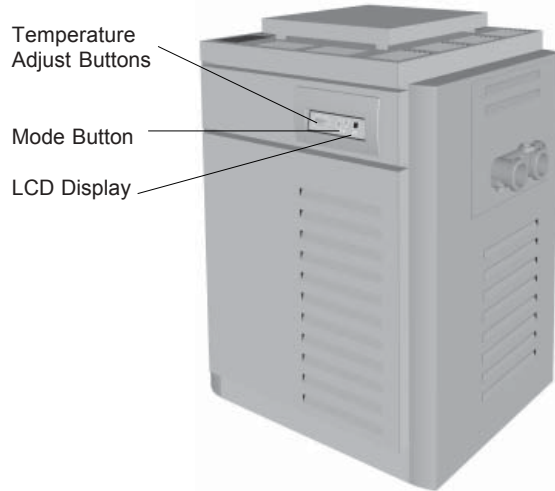


Fig. #2000

### MILLIVOLT CONTROLS

The pool or spa water temperature is controlled by the pool heater thermostat on the upper front panel of the heater. The control center contains an On/Off switch and one or two thermostats.

Thermostats are fitted with a means of limiting the upper temperature limit below the maximum level. The knob stop adjustment ring illustrated below is adjustable by loosening the set screw, rotating the knob stop ring to the desired location and retightening the set screw.

SPA TEMPERATURE RANGE POOL TEMPERATURE RANGE

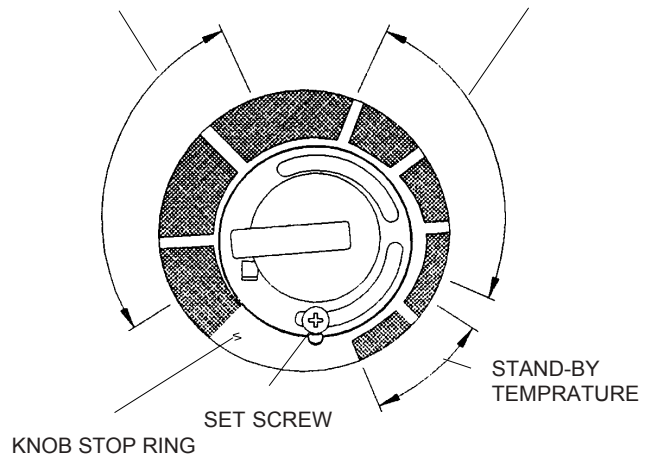


Fig. #8103.2

**KNOB STOP SHOWN ABOVE IS IN THE SPA TEMPERATURE RANGE**

## ELECTRONIC CONTROLS

### Notice to owner- Thermostat operation

Your heater is equipped with a microprocessor-controlled thermostat that controls the pool or spa temperature by measuring the temperature of water coming back through the heater. It will then monitor the temperature and turn the heater back on when it senses that the temperature is falling below set point. Small fluctuations in the return temperature are experienced during the operation of the heater. The thermostat is calibrated with a very close tolerance to insure accuracy of the set temperature. Thus, **slight fluctuations may cause your heater to cycle on and off frequently. This phenomenon is not a problem.** It will not harm the heater nor interfere with its function to precisely control the temperature of the pool or spa.

The pool heater thermostat on the upper front panel of the heater controls the pool/spa water temperature. This control center contains a mode button, up and down temperature adjustment buttons, and a LCD display. The MODE button functions as a means to turn the heater off or on in either the pool or spa temperature setting. The LCD display indicates the mode the heater is in and the actual water temperature. If the mode is in POOL or SPA, the desired pool or spa temperature will also be displayed and may be changed using the UP or DOWN buttons. A manual switch is also provided on the right side heater cabinet to allow the heater to be turned off. If there is a problem in operating the heater, the fault will be displayed and a service indicator will flash.

The electronic thermostat cannot be set above selected maximum set points. The maximum set point are factory selected at 104°F for spa and pool. These can be changed to a higher or lower value to suit your needs, but can never be set above 107°F. In order to change the maximum set point, push the MODE button to the OFF mode. Open the front panel as shown in the previous section. Find the SETMAX button on the back of the circuit board. Push the SETMAX button until the display indicates SET. Either POOL or SPA will be displayed with the upper temperature limit. If the desired mode is not being displayed, press the MODE button to switch to the desired mode. Using the UP or DOWN arrow buttons, adjust the upper temperature to the desired maximum setting. If a button is not pushed for 5 seconds, the control will return to the OFF mode.

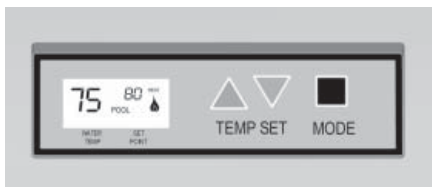


Fig #2007

The RP2100 Spa/Pool Digital Control Panel features an LCD display that provides status and service information. During normal operation, the heater can be in the POOL, SPA, or OFF modes.

In the OFF mode, the actual water temperature is displayed.

**NOTE:** The digital temperature display may not coincide with the temperature reading of your pool or spa thermometer. The RP2100 reads the water temperature at the inlet of the heater. Due to the circulation characteristics of any pool or spa, the water temperature at the inlet to the heater may differ from that observed at a given location in the pool or spa.

In the POOL or SPA modes, the actual water temperature is displayed along with the desired pool or spa temperature. If the heater is firing, a flame icon will be visible.

To adjust the desired pool or spa temperature setting, make sure the control is in the appropriate mode (POOL or SPA) and push the UP or DOWN buttons to get the desired set point temperature.

If there is a safety fault, a fault code will be displayed along with a service indication. If the PRS fault code is displayed, it indicates that there is insufficient flow through the heater. Make sure the pool filter and pump strainer are clean before calling a service representative.

Remote control operation is possible by connection to the remote terminals on the control board. (P7) When the remote control is operating the heater, the display will alternatively indicate REM and the actual water temperature.

A list of the status and service codes are shown below:

DISPLAY STATUS	
CFH	CALL FOR HEAT
SPK	SPARK
SERVICE	CALL YOUR LOCAL INSTALLER/SERVICE CONTRACTOR/FACTORY FOR SERVICE
HEAT	HEATING
REM	REMOTE CONTROL
CLK	HEATER IN COOL DOWN CYCLE OR FIREMAN SWITCH OPEN
DISPLAY FAULTS	
BRD	BOARD FAILURE
SNS	1) SENSOR IS FAULTY 2) TEMPERATURE IS ABOVE 110°F 3) TEMPERATURE IS BELOW 36°F
PRS	PRESSURE SWITCH OPEN
HL 1	HILIMIT-1 SWITCH OPEN
HL 2	HILIMIT-2 SWITCH OPEN
ROL	HEAT ROLL-OUT SAFETY SWITCH OPEN
IGN	IGNITION CONTROL FAILURE
PLT	PILOT FAILURE
LOW	WATER TEMP BETWEEN 36°F AND 44°F



## TEMPERATURE DISPLAY-Fahrenheit vs. Centigrade

The RP2100 digital heaters will display metric (Centigrade) units. The factory default setting is Fahrenheit. If you open up the front panel so you are looking at the front of the digital board, you will find two small round buttons, labeled S1 and S2. S1 is labeled "C of F". Hold down the S1 button for several seconds, until the board displays "CCC", this will set the board to display in Centigrade. Repeating the process will return the board to "FFF" which is Fahrenheit.

## RP2100 REMOTE CONTROL INSTALLATION

### **CAUTION: Before installing remote controls to the RP2100 Digital Heater, read the following:**

The Raypak RP 2100 Digital Heater is remote ready in most cases. The digital liquid crystal (LCD) display shows the actual pool temperature, operating status, and service codes (See examples below). The touch pad on the control panel allows you to select the desired pool or spa temperature. It also indicates when a remote system is controlling the heater by displaying REM in the display. When connecting the RP2100 Digital to a remote system, identify whether it is a two or three wire remote system. Select the appropriate instruction listed below to properly install the remote to the heater.



OFF Mode



Heating in the POOL Mode



Heating in the SPA Mode



Remote Mode

### **Important Installation Notes for Remote or external wiring configuration**

- Remote wiring must be run in separate conduit.
- Remote wiring must not be run parallel to High Voltage lines.
- For runs of under 30 feet, remote wiring should have stranded conductors with a minimum of 22 AWG, 600V, cable twisting 1.5 to 2.5 and jacketed.
- For runs over 30 feet, the conductors should be a minimum of 20 AWG, 600V, cable twisting 1.5 to 2.5 inch lay that is shielded and jacketed.
- Maximum cable length of 200 feet.
- For both Two and Three wire remote systems, the provided P-7 wiring connector must be utilized. Please refer to the wiring instructions.

### **Two-Wire Remote Operation:**

To remotely select a single operating ON/OFF mode (2 wire/single function) requires two wires to be connected to the heater. This requires a switching mechanism that can be a 2-way switch or a remote control system with a single dry contact closure. See remote wiring instructions for Two-Wire One Function.

### **Three-Wire Remote Systems:**

To remotely select either pool or spa operation (3-wire/2-function) requires 3 wires to be connected to the heater. A switch mechanism that will provide contact closure between HIGH/SPA or LOW/POOL and common, needs to be supplied. This mechanism can be a 3-way switch or any other remote control system that provides dry contact closure for either setting. See remote wiring instructions for Three-Wire Two Function.

**NOTE: Do Not connect wiring to fireman switch location.**



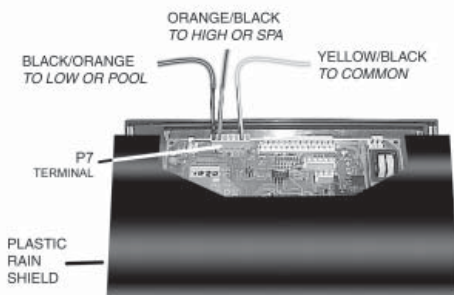
**Note:** ElectroStatic Discharge (ESD) damage can be caused by direct or indirect contact with the wiring or circuit board. When one walks to the heater area, an electrostatic charge accumulates on the body. Contact of a finger allows the body to discharge, possibly causing device damage. This damage can be limited if the service person discharges himself by removing that charge by adhering to ESD preventative/removal practices and reducing that charge by holding on to the heater enclosure for 5 seconds before proceeding.

## Remote Wiring Instructions



Fig#9375

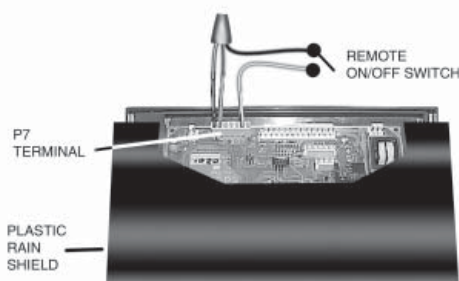
1. Turn off power to the heater.
2. Turn off gas to the heater.
3. Remove the four screws on the side of the heater holding the control panel (see figure # 9375).



Fig#9373

### THREE WIRE TWO FUNCTION

4. Perform ESD charge removal procedures:  
Lay control panel forward towards you. This will provide access to the back of the temperature control board.
5. Remove the Remote Wire Harness Adaptor from the wire bundle or from the P7 terminal (see figure # 9373).



Fig#9374

### TWO WIRE ONE FUNCTION ON/OFF ONLY

6. For a 3-wire/2 function configuration, connect the HIGH/SPA wire to the orange wire with the black stripe; the LOW/POOL wire to the black wire with the orange stripe; and the common wire to the yellow wire with the black stripe (see figure # 9373).
7. For the 2-wire/1 function configuration, connect the orange/black and black/orange wires to one contact and the yellow/black wire to the other contact (see figure # 9374).
8. Perform ESD charge removal procedures:  
Install the Remote Wiring Harness Adaptor on the P7 terminal.

### To Disconnect Remote Controller and Re-connect Factory Wiring:

1. Turn OFF power to the heater.
2. Access the back of the digital board.
3. Disconnect the P7 plug where the remote wires are connected
4. Reconnect the black connector at P5 terminal.
5. Turn ON power to the heater.

## PRESSURE SWITCH

The pressure switch, or heater actuator, insures that the heater operates only when the filter pump is in operation. It is located on the inlet/outlet header. It is factory set at 1.75 PSI for deck level installations. When the heater is located below the level of the spa or pool, it may be necessary to reset the pressure switch to compensate for the no-flow static head. If it is necessary to reset the pressure switch, utilize the following procedure:

### PRESSURE SWITCH ADJUSTMENT



Fig. #9438

Adjustment Knob

1. With pump and heater on, turn adjustment knob (clockwise) until a click is heard from the gas valve.
2. Turn adjustment knob (**counter clockwise**) 1/4 turn.
3. Turn pump off and on several times. Heater should shut off immediately. If it does not, repeat steps above until proper adjustments made.

### PRESSURE SWITCH ADJUSTMENT RANGE

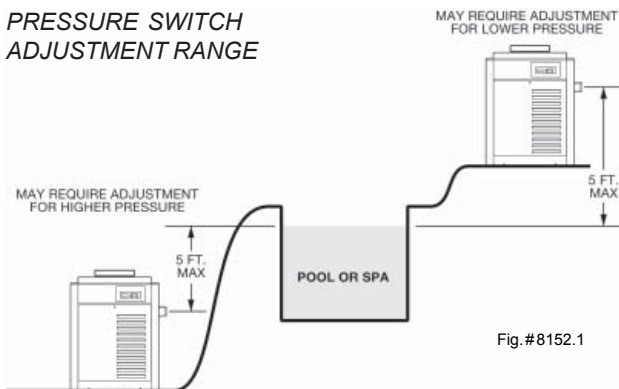


Fig. #8152.1

**NOTE:** If heater is installed outside of the limits shown, a higher pressure rated (11 psi) switch may be used or a flow switch mounted and wired adjacent to the heater may be used in place of the factory mounted pressure switch. See Parts List for 11 psi pressure switch.

### TWO SPEED PUMPS

In some cases, the flow on the low speed is insufficient to operate the heater. This is apparent when the pressure switch cannot be further adjusted or if the heater makes banging noises or goes off on high limit. In these cases, the pump must be run at high speed when heating the water.

**CAUTION:** Do not operate the heater without the function of a properly adjusted pressure switch or flow switch.

## FLAME ROLL-OUT SAFETY SWITCH

The heater is equipped with a thermal cutoff device to prevent flame roll-out in the event the heat exchanger becomes blocked. This is a "Single-use" type fusible link or thermal fuse, that must be replaced when disabled by an over temperature condition, caused by excessive restriction in the heat exchanger flue passage.



Fig. #9440

### HIGH LIMITS

The heater is equipped with two automatic high limits. Both are located in the inlet/outlet header. Both are set to open at 135°F.

**NOTE:** An erratic high limit is often characteristic of internal heat exchanger problem, i.e. scale buildup, defective bypass. Refer to troubleshooting sections.

### HIGH LIMIT REMOVAL

1. Shut off main electrical power switch to heater.
2. Remove inlet/outlet inspection panel.
3. Remove defective high limit and replace with a new high limit.
4. Replace inspection panel.



Fig. #9439

### PILOT SAFETY (Millivolt)

The heaters equipped with the standing pilot (millivolt system), have pilot generators which act as a safety device to shut off the flow of gas to the main burners and the pilot burner in case the pilot flame is extinguished. The pilot burner must be manually relighted to place the heater in operation again. Refer to the lighting instructions provided on the heater label.

### PILOT SAFETY (Electronic)

The heater employs a pilot safety which closes the main gas valve within 8/10ths of a second whenever the pilot flame is interrupted. Pilot flame is automatically lit when the device is powered. Unit performs its own safety check and opens the main valve only after the pilot is proven to be lit.

### BURNER DRAWER REMOVAL

1. Shut off main electrical power switch to heater.
2. Shut off gas upstream of heater.
3. Remove front door.
4. Disconnect gas line from gas valve.
5. Remove (2) screws that mount burner tray to unit, and (2) screws that secure gas valve to jacket.
6. Disconnect wires that terminate at gas valve.
7. Slide out burner tray.
8. Reverse above procedure to reinstall.

### GAS VALVE REMOVAL

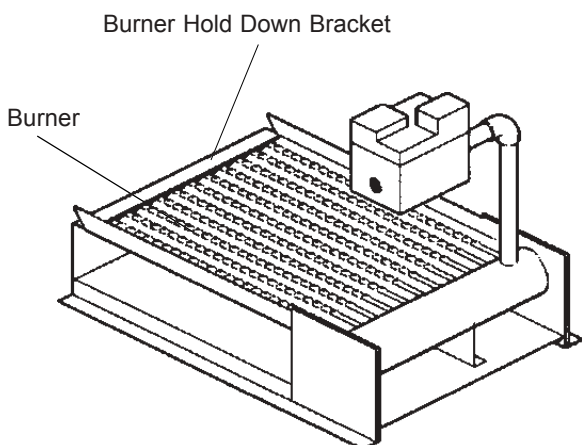
1. Shut off gas supply to the heater. Remove gas piping to gas valve inlet.
2. Disconnect wires, pilot tubing and bleed line, if required.
3. Turn vertical gas pipe from manifold slightly and unscrew gas valve.
4. Reverse above procedure to re-install.

### MAIN BURNER AND ORIFICE REMOVAL

1. Remove burner drawer. See burner drawer removal procedure.
2. Remove screws and burner hold down bracket.

**NOTE:** If the heat exchanger is sooted badly, the burner hold down bracket and spacer can become distorted from direct flame impingement and this usually necessitates replacement of these parts.

3. Lift burners from slotted spacers and slide from orifices. Clean with a wire brush.
4. Orifices usually do not need to be replaced. To clean, run either copper wire or wood toothpick through orifice. Do not enlarge hole. To remove orifice, use a socket wrench and remove from manifold. **DO NOT** overtighten when reinstalling.



8057.0

### PILOT REMOVAL AND CLEANING

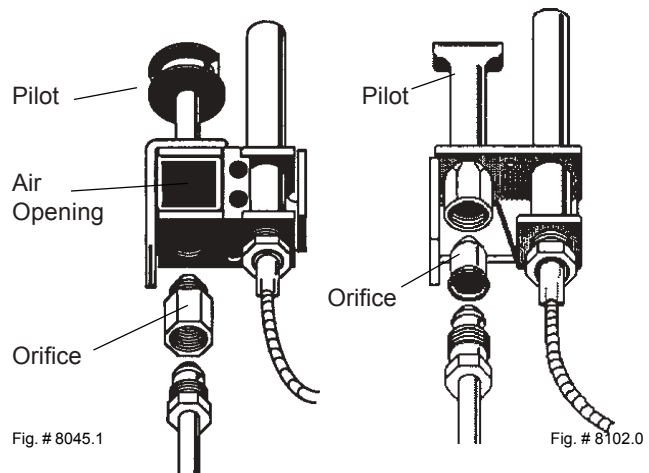
1. Disconnect pilot tubing, and wires from gas valve.
2. Remove pilot assembly from burner tray.
3. Remove pilot from bracket.
4. Remove pilot orifice and air opening (Honeywell MV unit only), and clean with wire or small brush.

**CAUTION!** Do not enlarge hole in pilot orifice.

5. Reverse above procedure to re-install.

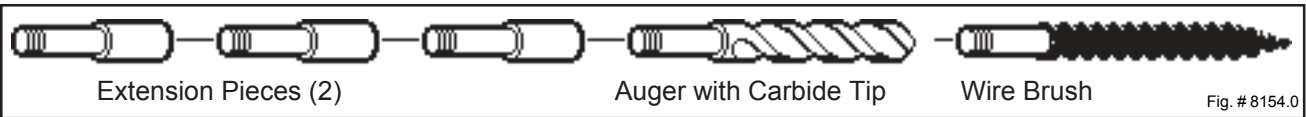
### HONEYWELL PILOT

### ROBERTSHAW PILOT



### HEAT EXCHANGER REMOVAL

1. Shut water, gas and electricity off, close valves and relieve pressure, remove relief valve. Remove side inspection panels.
2. Remove top holding screws.
3. Remove draft diverter, lift and remove top and flue collector. Remove inspection panels.
4. Disconnect wires from high limits and pressure switch. Remove temperature sensor.
5. Disconnect flange nuts on inlet-outlet header, loosen union(s) at gas pipe and slide boiler away from piping.
6. Lift heat exchanger straight up using caution not to damage refractory.
7. Reverse above procedure to reinstall. Make sure the insulation strips are properly replaced on top of the refractory retainer.



### TUBE CLEANING PROCEDURE

Establish a regular inspection schedule, frequency depending on local water condition and severity of service. Do not let the tubes clog up solidly. Clean out deposits over 1/16" in thickness.

The heater may be cleaned from the return header side, without breaking pipe connections. It is preferable, however, to remove both headers for better visibility through the tubes and to be sure the ground-up lime dust does not get into the system.

Note that you do not remove the top panel or the heater exchanger, generally.

After reaming, mount the wire brush in place of the auger and clean out debris remaining in the tubes.

Another method is to remove the heat exchanger, ream tubes and immerse heat exchanger in non-inhibited de-scale solvent for severe scale build-up.

### DESOOTING PROCEDURE

**CAUTION: SOOT IS COMBUSTIBLE. EXERCISE EXTREME CARE:**

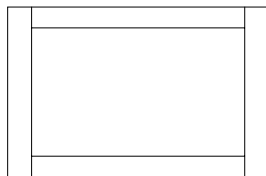
Soot will clog areas between fins and cause eventual tube failure. Any sign of soot at the base of the burners or around the outer jacket indicates a need for cleaning.

1. Remove top and flue collector from cabinet.
2. Remove "V" baffles from heat exchanger.
3. Remove burner drawer. (See burner tray removal).
4. Remove heat exchanger from the heater and wash with a garden hose, making sure soot is removed from spaces between fins.
5. Reverse above procedure to re-install.

**NOTE: In extreme cases it may be necessary to do steam cleaning at the local car wash. DO NOT WIREBRUSH.**

### COMBUSTION CHAMBER REMOVAL

To remove combustion chamber, you must first have removed the heat exchanger. Unbolt metal combustion chamber retainer from top and remove combustion chamber panels individually.



REFRACTORY PANELS TOP VIEW

Fig. #RP8155.0

### CONTROL IMMERSSION WELL REPLACEMENT (Millivolt and ASME)

1. Shut water off to heater and drain heat exchanger.
2. Remove access panel on water connection side of heater.
3. Remove old control well with bushing and sleeve.
4. Install in header.

**NOTE: Installation in plastic should be hand tight plus 1/2 turn.**

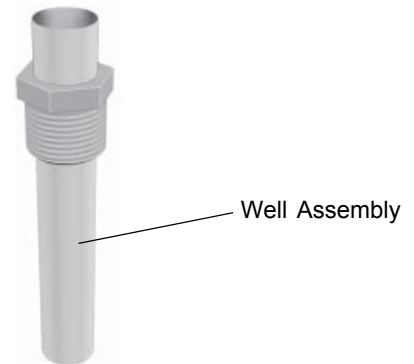


Fig. #2010

### UNITHERM GOVERNOR (U.G.) REPLACEMENT

1. Shut water, gas and electricity off, close valves and relieve pressure.
2. Drain heat exchanger.
3. Remove retainer plug located next to the outlet pipe connection.
4. Remove old U.G. from retainer plug. It is snapped in place. Snap in new U.G.
5. Reinstall retainer plug, taking care to lubricate gasket with a non-petroleum based grease such as AquaLube.

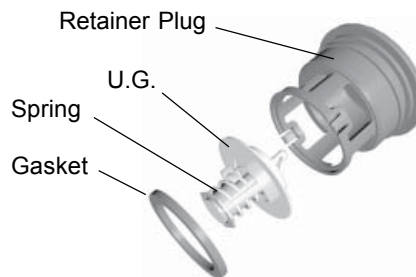


Fig. #2011

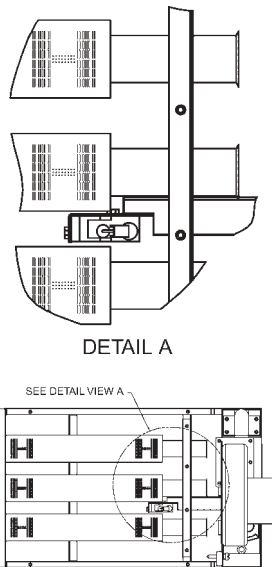
To test the operation of the Unitherm Governor, place in hot water (over 100°F) and watch for movement against spring. If there is no movement, replace unit.



## ADDENDA: LOW NO<sub>x</sub> POOL HEATERS

The Raypak Low Nox Pool Heaters are certified and tested under the ANSI Z21.56.CSA 4.7 Standards for gas fired pool heaters.

The heater should be installed to meet all local codes, the latest editions of the National Fuel Gas Code Z223.1 and the National Electrical Code, ANSI/NFPA 70.



Fig# 9361

### OPERATION

On call for heat, the ignition system, consisting of an electronic spark module, gas pilot system is energized. Providing pilot is proven blower will start running, the main gas valve will open and the heater will operate. When the operating control is satisfied the heater will shut down.

### START-UP PROCEDURES (S8610B)

1. Turn on power to the heater with gas supply off.
2. Check ignition module as follows:
  - a. Set the thermostat or controller to call for heat.
  - b. Watch for continuous spark at the pilot burner.
  - c. Check the ignition spark operation. Time must be within the lockout timing period (15 or 90 seconds).
  - d. Turn control down to end call for heat and wait 60 seconds on lockout models before beginning step 3.
3. Turn on gas supply.
4. Set controller to call for heat.
5. System should start as follows:
  - a. Spark will turn on and pilot gas valve will open and the blower will begin running.
  - b. Heater will operate until call for heat is satisfied.

### BURNER ADJUSTMENT

This burner assembly does not require any primary air adjustments.

### VISUAL INSPECTION

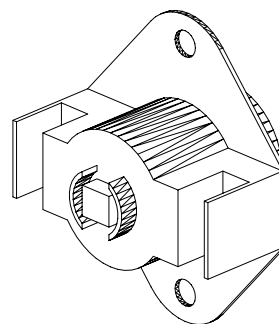
Flame can be observed through the slot opening above the plenum. Flame color is blue and evenly spread on the top surface of the burner. At least every three months a visual inspection should be made of the burners. In case flame lifting is observed on the burner, check gas pressure on manifold. Gas pressure in manifold should be 3.9" W.C.

### ELECTRICAL

Be sure that electrical service to the boiler has proper overload fuse or circuit breaker protection, wire size and connections which comply with all applicable codes.

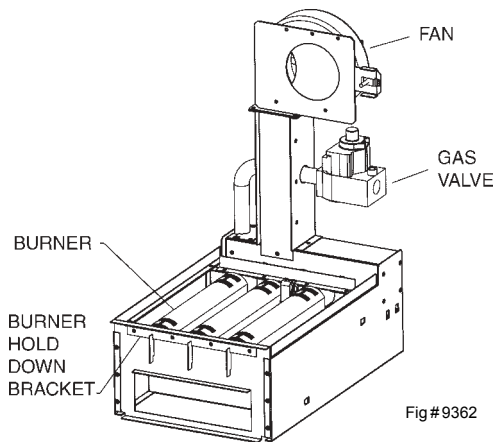
### FLAME ROLL-OUT SAFETY SWITCH

The heater is equipped with a cutoff device to prevent flame roll-out in the event the heat exchanger becomes blocked. This is a "manual reset" type roll-out switch that must be reset by a service technician after any over temperature conditions have been fixed. Excessive restriction in the heat exchanger flue passage may cause the switch to disable the heater.





## ADDENDA: LOW NOX HEATERS (CONTINUED)



Fig#9362

### LOW NO<sub>x</sub> BURNER TRAY ASSEMBLY

#### BURNER DRAWER REMOVAL

1. Shut off main electrical power switch to heater.
2. Shut off gas upstream of heater.
3. Remove front door.
4. Disconnect gas line from gas valve.
5. Remove (2) screws that mount burner tray to the base of the unit, and (2) screws that secure gas valve to jacket.
6. Disconnect wires that terminate at gas valve.
7. Unscrew (4) screws that secure the control box.
8. Disconnect pilot wire from the ignition module.
9. Disconnect wire harness from the combustion blower.
10. Carefully slide out the burner tray assembly.
11. Reverse above procedure to reinstall.

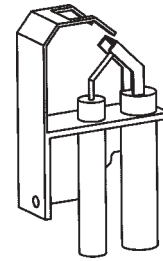
#### GAS VALVE REMOVAL

1. Remove burner drawer. See burner removal procedure.
2. Disconnect, pilot tubing from gas valve.
3. Turn vertical gas pipe from manifold slightly and unscrew gas valve.
4. Reverse above procedure to re-install.

#### MAIN BURNER AND ORIFICE REMOVAL

1. Remove burner drawer. See burner drawer removal procedure.
2. Remove pilot. See pilot removal procedure.
3. Remove (8) total screws from the hold down brackets, front and rear of tray.
4. Remove (8) total screws from the left and right sides of the Manifold assembly. Detach the manifold assembly from the burner tray assembly.
5. Remove burners by raising the bracket on the back end of the burners up and out of their slots.

6. Use a long 9/16" socket wrench to remove orifices from the gas manifold.
7. Reverse above procedure to re-install.

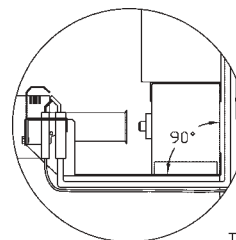


Fig#9363

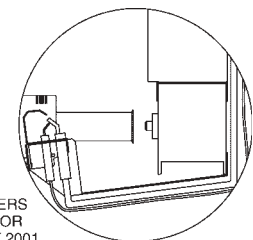
### IID PILOT

#### PILOT REMOVAL

1. Disconnect pilot tubing from gas valve.
2. Remove (4) screws from control box. Open the control box.
3. Remove the pilot wire from the ignition wire.
4. Remove (2) screws that mount the pilot bracket to the air manifold assembly.
5. Pull the pilot bracket slightly, then drop and pull downwards and outwards.
6. Reverse above procedure to re-install. Make sure the pilot bracket is all the way up on the pilot side, see drawing below.

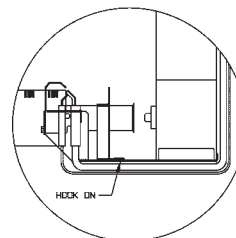


CORRECT

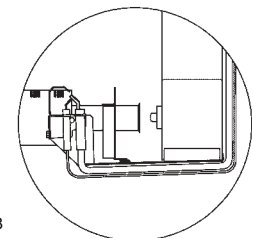


INCORRECT

FOR HEATERS  
MADE PRIOR  
TO AUGUST 2001



CORRECT



INCORRECT

Fig#9368

#### COMBUSTION FAN REMOVAL

1. Remove burner drawer. See burner drawer removal procedure.
2. Remove (4) screws that mount the combustion blower to the manifold assembly.
3. Reverse above procedure to re-install.

## SECTION 5 / TROUBLE SHOOTING GUIDE

### MECHANICAL (FOR QUALIFIED SERVICE PERSONNEL ONLY)

**IMPORTANT NOTICE** These instructions are primarily intended for the use of qualified personnel specifically trained and experienced in the installation of this type of heating equipment and related system components. Installation and service personnel may be required by some states to be licensed. Persons not qualified shall not attempt to install this equipment nor attempt repairs according to these instructions.

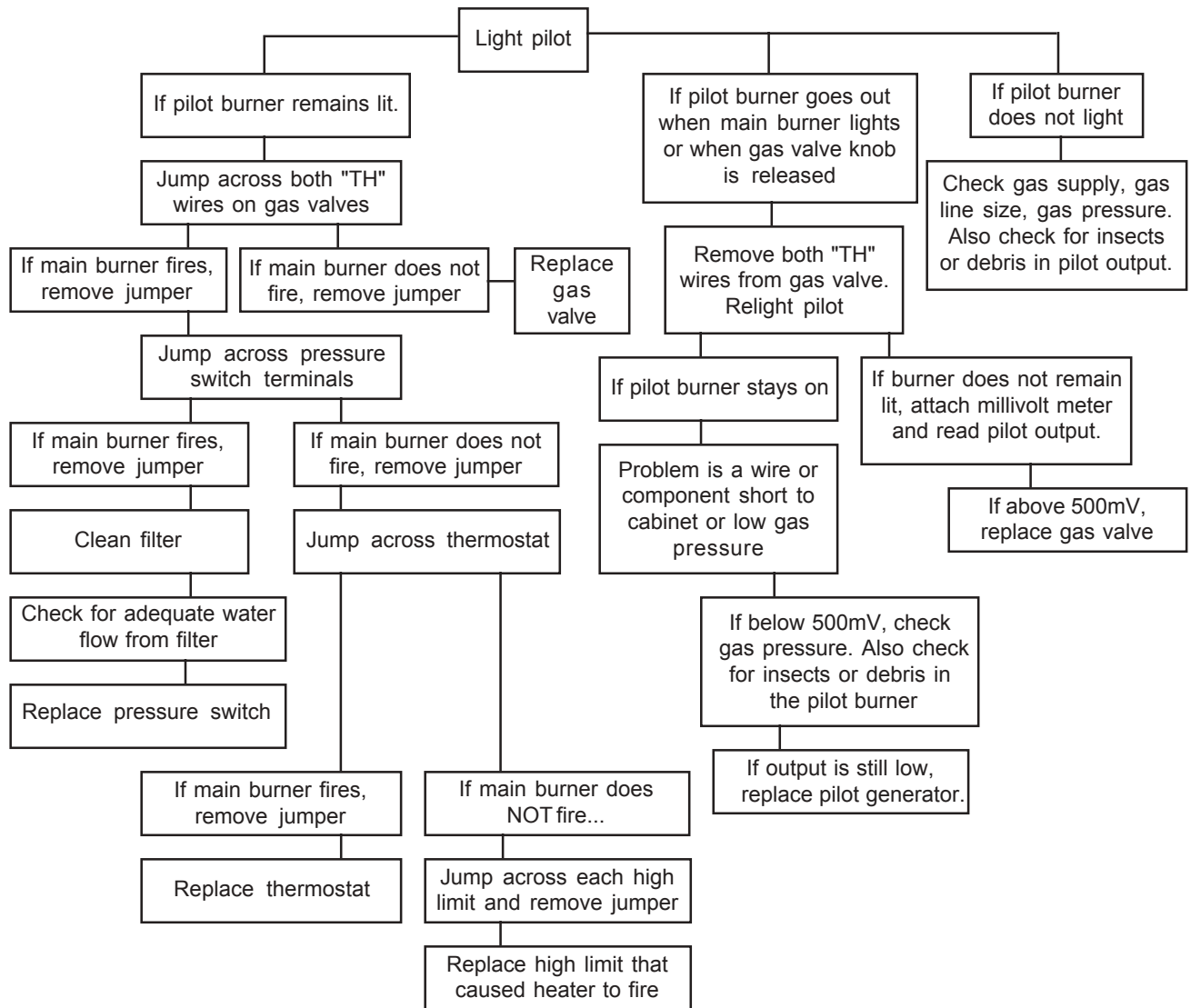
<b>PROBLEM</b>	<b>CAUSE</b>	<b>SOLUTION</b>
<b>Harmonics, or whining noise</b>	U.G. inoperative.....	Check movement by putting in hot water (110°F or high higher). If no movement, replace.
	*Debris or restriction in system.....	Locate the restriction and remove. Flush system and clean.
	*Debris in gas line.....	Remove debris or blow out gas line.
	Low flow.....	Scale forming in heat exchanger - clean heat exchanger and check pool pH and total alkalinity.
<b>Heater going on and off continuously</b>	Dirty filter.....	Backwash filter.
	Low water level in pool.....	Raise water level.
	External bypass setting out of adjustment.....	Adjust bypass
	*Pressure switch out of adjustment.....	Adjust pressure switch
<b>Liming or scale forming on heat exchanger</b>	Pool water.....	Recommended pH should be between 7.4 and 7.8 Total alkalinity 100-150 PPM maximum. Hardness 150-400 PPM maximum.
<b>Sooting</b>	High flow rates.....	Reduce by adding manual bypass valve. Adjust manual bypass valve until heater outlet water temperature is between 105° and 110°F.
	U.G. Inoperative.....	Check movement by putting in hot water (110°F or higher). If no movement, replace.
	*Air starvation.....	Refer to installation instructions.
	*Improper venting.....	Follow recommended installation instructions.
	*Insects or debris clogging burner intake ports.....	Clean burners.
<b>Pilot outage</b>	Low gas pressure.....	Adjust gas pressure.
	Restricted pilot.....	Clean pilot.
	Weak pilot generator.....	Replace pilot.
<b>Yellow lazy flame</b>	Low gas pressure.....	Adjust gas pressure.
	*Insects or debris clogging burner intake ports.....	Clean burners.
<b>Outer jacket very hot (paint blistered)</b>	*Broken refractory caused by shipping damage or improper combustion.....	Replace refractory panels.
	Excessive sooting of heat exchanger.....	Determine cause of sooting & correct.
<b>Takes long time to heat pool or spa.</b>	Calculate temperature in °/hr.....	Heat rise (°/hr.)= $\frac{\text{Htr. output}}{\text{Pool gallonage} \times 8.33}$ or refer to heater sizing chart. This does not take into account heat loss due to weather.
	Filter not running long enough.....	Reset time clock.
	Dirty filter.....	Clean filter.
	Gas line or meter undersized.....	Refer to installation instructions.
<b>Liming</b>	Bypassing too much water.....	Inspect bypass for movement, if no movement, replace.
	U.G. not functioning.....	Replace if no movement when heated.
<b>Leaking at well.</b>	Overacid.....	Replace well and maintain water chemistry properly.
<b>Leaking at heat exchanger.</b>	Overacid.....	Replace heat exchanger and maintain chemistry properly.
<b>Gasket brittle and leaking - (overheated).</b>	Heater running after pump shuts off.....	See pressure switch adjustment.
	Refractory damage.....	Replace refractory.
	Sooted heater.....	Determine cause of sooting and correct.
<b>Combustion fan not running</b>	Fan relay.....	Replace fan relay
	Fan.....	Loose connection or failed motor
	Burned motor .....	Incorrect wiring, replace blower

(\* Indicates symptom usually occurs on initial start-up.) 34

**RAYPAK POOL OR SPA HEATER  
ELECTRICAL CHECK WITH MV GAS VALVE**

**CAUTION:** For qualified service personnel *only*.

1. Filter must be on with adequate water flow through heater.
2. Gas valve must be "ON" position. Thermostat set higher than pool water temperature.
3. Jumpers are for temporary check only. If left in place, they could cause the heater to burn up.



**ELECTRICAL  
(ELECTRONIC IGNITION IID)**

**WARNING HIGH VOLTAGE**  
For qualified Technicians ONLY

NOTE: Some heaters may be equipped with an ignition module that shuts off pilot gas if pilot fails to light. To reset, interrupt power to heater.

**Intermittent Pilot System  
TROUBLESHOOTING HONEYWELL S8600**

NOTE: Before troubleshooting, familiarize yourself with the startup and checkout procedure.

Check line voltage power, low voltage transformer, limit controller, thermostat (controller) and wiring.

Pull ignition lead and check spark at module.

Spark Okay?

- Check ignition cable, ground wiring, ceramic insulator and gap, and correct.
- Check boot of the ignition cable for signs of melting or buckling. Take protective action to shield cable and boot from excessive temperatures.

- Check that all manual gas valves are open, supply tubing and pressures are good, and pilot burner orifice is not blocked.
- Check electrical connections between module and pilot operator on gas control.
- Check for 24 Vac across PV-MV/PV terminals on module. If voltage is okay, replace gas control; if not, replace module.

NOTE: If S8600H goes into lockout, reset system. Lockout is used on L.P.G. models.

- Check continuity of ignition cable and ground wire.
- Clean flame rod.
- Check electrical connections between flame rod and module.
- Check for cracked ceramic flame rod insulator.
- Check that pilot flame covers flame rod and is steady and blue.
- Adjust pilot flame.
- If problem persists, replace module.

- Check for 24 Vac across MV-MV/PV terminals. If no voltage, replace module.
- Check electrical connections between module and gas control. If okay, replace gas valve or gas control operator, i.e. pilot gas valve, flow switch etc.

NOTE: IF S8600H goes into lockout, reset system.

- Check continuity of ignition cable and ground wire.
- NOTE: If ground is poor or erratic, shutdowns may occur occasionally even though operation is normal at the time of checkout.
- Check that pilot flame covers flame rod and is steady and blue.
  - If checks are okay, replace module.

- Check for proper thermostat (controller) operation.
- Remove MV lead at module; if valve closes, recheck temperature controller and wiring; if not, replace gas valve.

Repeat procedure until troublefree operation is obtained.

**START**  
TURN GAS SUPPLY OFF.  
TURN THERMOSTAT  
(CONTROLLER) TO CALL  
FOR HEAT  
POWER TO MODULE  
(24 V NOMINAL)

SPARK ACROSS  
IGNITER/SENSOR GAP

TURN GAS SUPPLY ON  
PILOT BURNER LIGHTS?

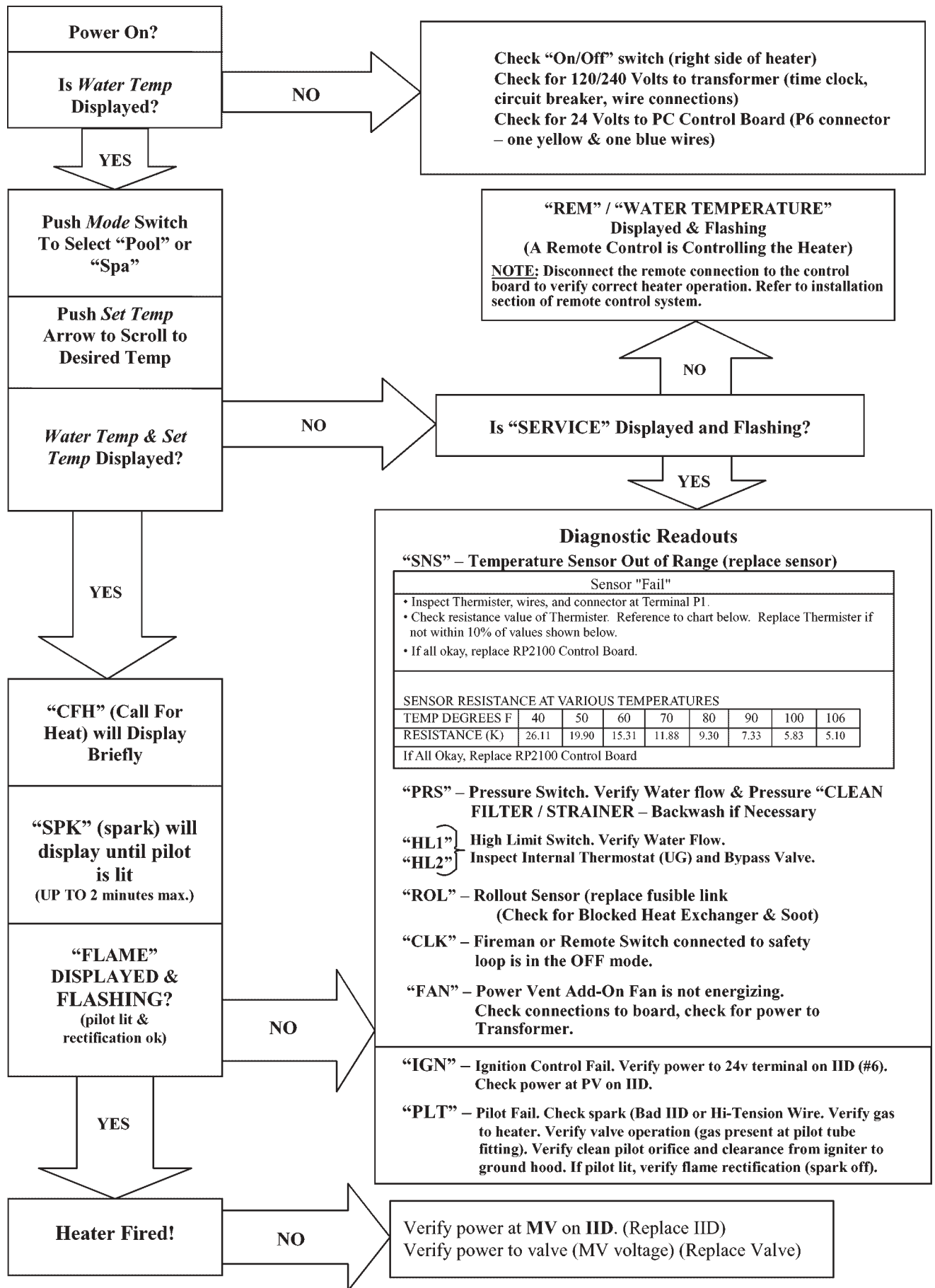
SPARK STOPS WHEN  
PILOT IS LIT?

MAIN BURNER LIGHTS?

SYSTEM RUNS UNTIL  
CALL FOR HEAT ENDS?

CALL FOR HEAT ENDS  
SYSTEM SHUTS OFF?

TROUBLESHOOTING  
ENDS





## SECTION 6/REPLACEMENT PARTS LIST

**NOTE:** To supply the correct part it is important that you state the model number, serial number and type of gas when applicable.

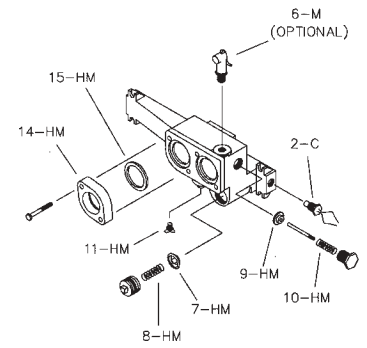
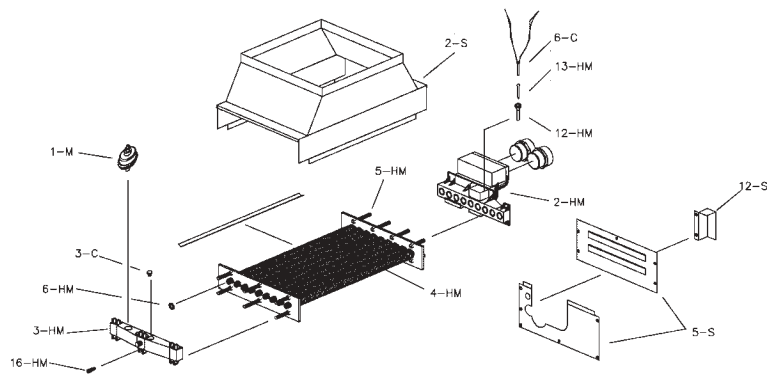
Any part returned for replacement under standard company warranties must be properly tagged with RAYPAK return parts tag, completely filled in with the heater serial number, model number, etc., and shipped to the Company freight prepaid.

If determined defective by the Company and within warranty, the part will be returned in kind or equal substitution, freight collect. Credit will not be issued.

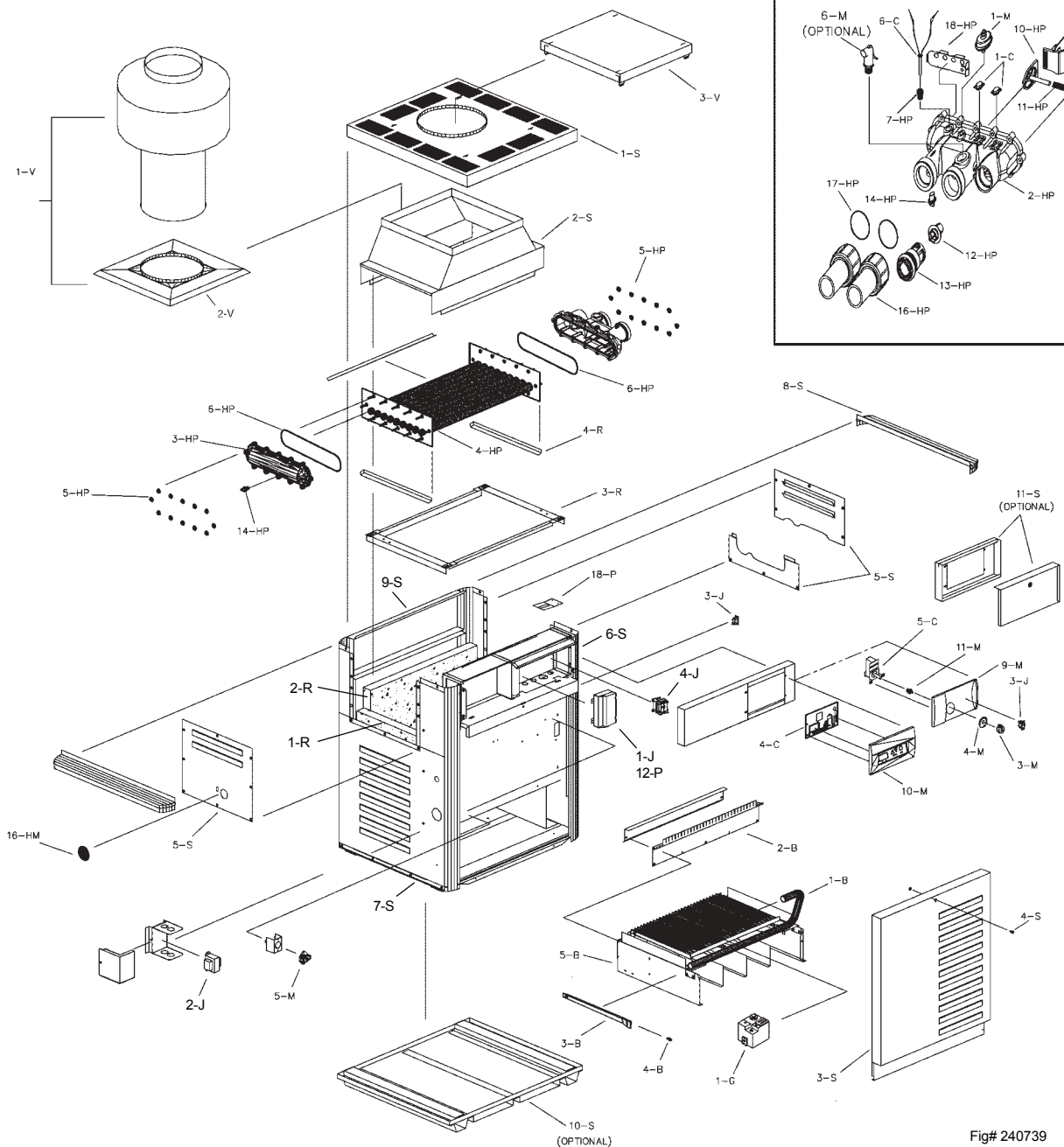
**RAYPAK, INC**  
**2151 Eastman Avenue**  
**Oxnard, CA 93030**

**For Canada:**

**RAYPAK CANADA LTD.**  
**2805 SLOUGH STREET**  
**MISSISSAUGA, ONTARIO**  
**L4T 1G2**

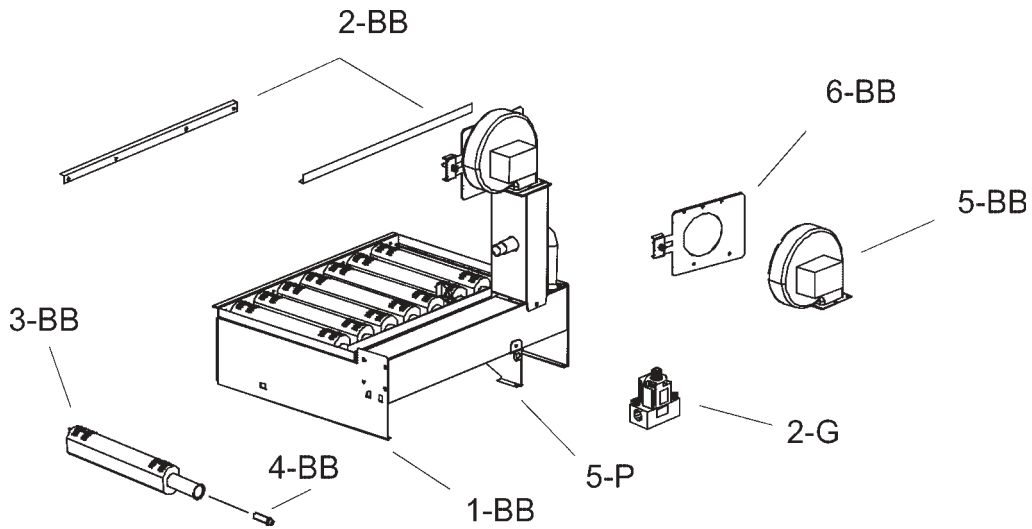


⬆ FOR UNITS WITH ASME METAL HEADERS ⬆

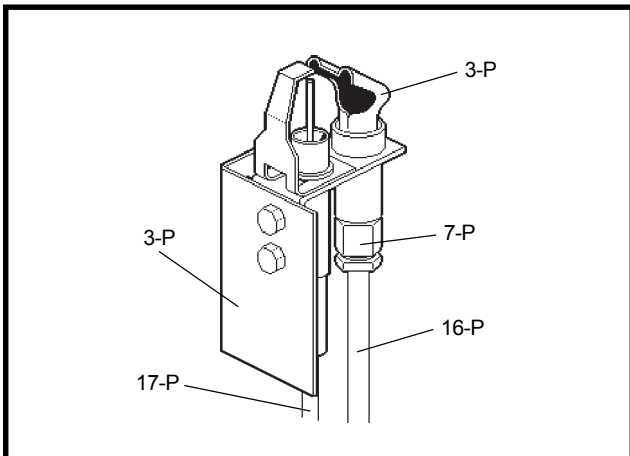


Fig# 240739

## Low NOx BURNER TRAY

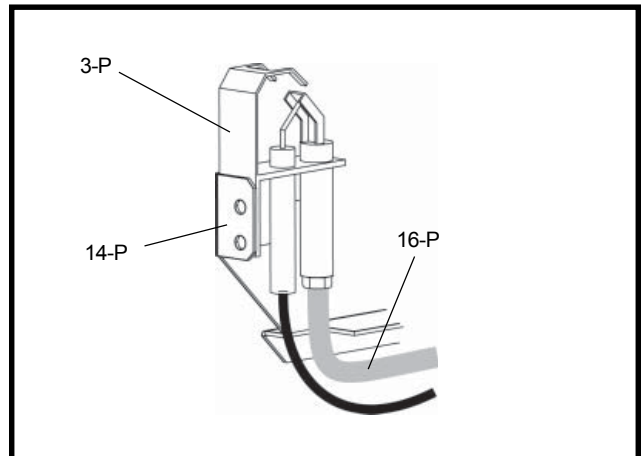


## PILOT ASSEMBLIES



Honeywell IID Atmospheric units  
for units produced prior to 06/01/2000

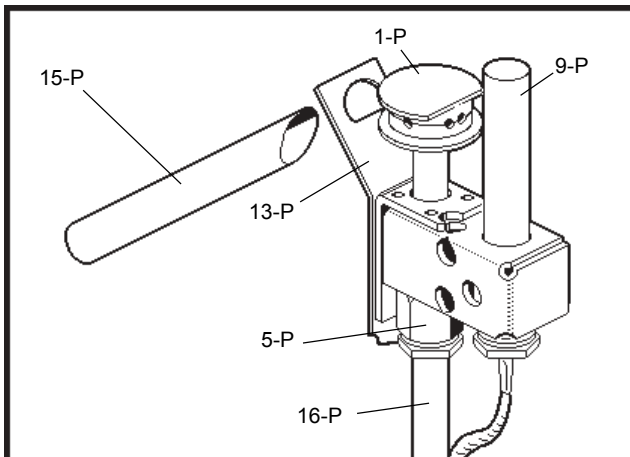
Fig. #8124



Honeywell IID Low NOx and Atmospheric units  
for units produced after to 06/01/2000

Fig. #9369

Use KIT Number 008155F for Low NOx units  
Use KIT Number 002003F for Atmospheric units



Honeywell MV

Fig. #8107

CALL OUT	DESCRIPTION	185	265	335	405
<b>B</b>	<b>BURNER TRAY (Atmospheric)</b>				
1-B	Burner Tray w/Burners (sea level)*	005213F	005214F	005215F	005216F
	Burner Tray w/o Burner (sea level)*	005217F	005218F	005219F	005220F
	Burner Tray w/Gas Valve Nat Millivolt	005221F	005222F	005223F	005224F
	Burner Tray w/Gas Valve Pro Millivolt	005225F	005226F	005227F	005228F
	Burner Tray w/Gas Valve Nat IID	005229F	005230F	005231F	005232F
	Burner Tray w/Gas Valve Pro IID	005233F	005234F	005235F	005236F
2-B	Burner Spacer/Hold Down Kit	005237F	005238F	005239F	005240F
3-B	Burner	301210/13	301210/19	301210/24	301210/29
4-B	Burner Orifice Nat. #51 (Sea Level)*	350080F/13	350080F/19	350080F/24	350080F/29
	Burner Orifice Pro. #57 (Sea Level)*	350083F/13	350083F/19	350083F/24	350083F/29
5-B	Burner Tray w/o Manifold w/o burners	005265F	005266F	005267F	005268F
<b>BB</b>	<b>BURNER TRAY (Fan Assisted Low Nox)</b>				
1-BB	Burner Tray w/Burners (0-5000)	007994F	007995F	007996F	007997F
	Burner Tray w/o Burner (0-5000)	007998F	007999F	008000F	008001F
2-BB	Burner Hold Down Kit	008002F	008003F	008004F	008005F
3-BB	Burner	309255/3	309255/5	309255/6	309255/7
4-BB	Burner Orifice Nat. #30 (0-5000)*	351510/3	351510/5	351510/6	351510/7
	Burner Orifice Nat. #31 (above 5000 ft.)*	351523/3	351523/5	351523/6	351523/7
5-BB	Blower	008080F	008080F	008080F	008080F
6-BB	Air Shutter	008133F	008134F	008134F	008172F
<b>C</b>	<b>CONTROLS</b>				
1-C	Thermostat Auto Reset 135 Deg Surf Mount	006725F	006725F	006725F	006725F
2-C	AGS 135° (Auto Gas Shut-Off) - Red Epoxy	600892B	600892B	600892B	600892B
3-C	High Limit 140° - Black Epoxy	600893B	600893B	600893B	600893B
4-C	P. C. Board Control IID Units	008260F	008260F	008260F	008260F
5-C	Thermostat Control MV Units Mechanical	003346F	003346F	003346F	003346F
6-C	Temperature Sensor IID Units	006701F	006701F	006701F	006701F
<b>G</b>	<b>GAS VALVE</b>				
1-G	Combination Valve - Nat. MV	003898F	003898F	003898F	003898F
	Combination Valve - Pro. MV	003899F	003899F	003899F	003899F
	Combination Valve - Nat. IID	003900F	003900F	003900F	003900F
	Combination Valve - Pro. IID	004306F	004306F	004306F	004306F
2-G	Combination Valve - Gas On/Off -Nat (for Low Nox)	007424F	007424F	007424F	007424F
<b>HP</b>	<b>HEAT EXCHANGER - CAPRON</b>				
1-HP	Heat Exchanger Assembly Complete	006702F	006703F	006704F	006705F
2-HP	Inlet/Outlet Header Complete	006827F	006827F	006827F	006827F
	Inlet/Outlet Header (Includes 6-H)	006706F	006706F	006706F	006706F
3-HP	Return Header (Includes 6-H)	006707F	006707F	006707F	006707F
4-HP	Tube Bundle **	006708F	006709F	006710F	006711F
5-HP	Bolt Kit	006712F	006712F	006712F	006712F
	Flange Nut Kit	008259F	008259F	008259F	008259F
6-HP	O Ring Gasket (2)	006713F	006713F	006713F	006713F
7-HP	Sensor Adapter Digital Electronic	006714F	006714F	006714F	006714F
	Sensor Well Millivolt	006805F	006805F	006805F	006805F
8-HP	Bypass Kit	006715F	006715F	006715F	006715F
9-HP	Bypass Valve	006716F	006716F	006716F	006716F
10-HP	Bypass Dam / Shaft	006717F	006717F	006717F	006717F
11-HP	Bypass Spring (All Sizes Included)	006718F	006718F	006718F	006718F
12-HP	Unitherm Governor	006719F	006719F	006719F	006719F
13-HP	Unitherm Governor Plug	006720F	006720F	006720F	006720F
14-HP	Drain Plug	006721F	006721F	006721F	006721F
15-HP	Inlet/Outlet Header Dam	006722F	006722F	006722F	006722F
16-HP	2" PVC Connector & Nut (2)	006723F	006723F	006723F	006723F
17-HP	O Ring (2)	006724F	006724F	006724F	006724F
18-HP	Stainless Steel Baffle	006826F	006826F	006826F	006826F

\*FOR ALTITUDES ABOVE 2,000 FEET LEVEL, CONSULT THE FACTORY

\*\*WARNING: The Hydraulic conditions or water chemistry that caused the tube bundle to fail have very likely also damaged the bypass valve and Unitherm Governor. We recommend you replace the Unitherm Governor and inspect the bypass assembly. Failure to do so could cause premature failure of this replacement part.



CALL OUT	DESCRIPTION	185	265	335	405
<b>HM</b>	<b>HEAT EXCHANGER - METAL</b>				
1-HM	Heat Exchange Assy. ASME CI (Complete)	006726F	006727F	006728F	006729F
2-HM	Inlet/Outlet Header ASME CI	006730F	006730F	006730F	006730F
3-HM	Return Header ASME CI	006731F	006731F	006731F	006731F
4-HM	Tube Bundle ASME **	006732F	006733F	006734F	006735F
5-HM	Bolt Kit	001303F	001303F	001303F	001303F
	Stud Bolt Kit	007870F	007870F	007870F	007870F
6-HM	Header Gasket (9)	800014B	800014B	800014B	800014B
7-HM	Unitherm Governor	062234B	062234B	062234B	062234B
8-HM	U.G. Retainer Spring	850254	850254	850254	850254
9-HM	Bypass Valve	062235B	062235B	062235B	062235B
10-HM	Bypass Spring	850252	850253	850253	850253
11-HM	Drain Valve	500719	500719	500719	500719
12-HM	Sensor Well	003765F	003765F	003765F	003765F
13-HM	Well Retaining Clip	300203	300203	300203	300203
14-HM	Inlet & Outlet Flange	003766F	003766F	003766F	003766F
15-HM	Flange Gasket 1 1/2" Connections	062236B	062236B	062236B	062236B
	Flange Gasket 2" Connections	800080B	800080B	800080B	800080B
16-HM	Rear Drain Plug & Cover	005264F	005264F	005264F	005264F
<b>J</b>	<b>CONTROL BOX</b>				
1-J	Ignition Control IID Nat.	004817B	004817B	004817B	004817B
	Ignition Control IID Pro.	004818B	004818B	004818B	004818B
	Ignition Control Low Nox	004818B	004818B	004818B	004818B
2-J	Transformer 120/240/24V	006736F	006736F	006736F	006736F
3-J	Rocker Switch	006872F	006872F	006872F	006872F
4-J	Relay Low Nox	008784F	008784F	008784F	008784F
<b>M</b>	<b>MISCELLANEOUS COMPONENTS</b>				
1-M	Pressure Switch 1.75 PSI	006737F	006737F	006737F	006737F
	Pressure Switch 11 PSI Special-See Adjustment in Service Manual	009133F	009133F	009133F	009133F
3-M	Thermostat Knob (1)	800303	800303	800303	800303
4-M	Knobstop (1)	006886F	006886F	006886F	006886F
5-M	Thermal Fuse (Atmospheric)	005899F	005899F	005899F	005899F
	Roll-Out Switch (Low Nox)	006035F	006035F	006035F	006035F
6-M	PRV 125 PSI (Optional)	008091F	007224F	007224F	007224F
7-M	Delimiting Kit	052871F	052871F	052871F	052871F
8-M	Wire/Harness Millivolt	005269F	005269F	005269F	005269F
	Wire/Harness IID	006738F	006738F	006738F	006738F
9-M	Control Panel MV	005291F	005291F	005291F	005291F
10-M	Control Panel IID (Includes Switch Decal)	008741F	008741F	008741F	008741F
	Control Panel IID/Low NOx (Includes Switch Decal)	006739F	006739F	006739F	006739F
	Switch/Decal-Membrane	009184F	009184F	009184F	009184F
11-M	Thermostat Shaft MV	800307	800307	800307	800307
<b>P</b>	<b>PILOT</b>				
1-P	Pilot Nat. MV	600525B	600525B	600525B	600525B
	Pilot Pro. MV	600575B	600575B	600575B	600575B
3-P	Pilot IID Atmospheric (includes nat & pro orifice) built before 06/01/2000	008668F	008668F	008668F	008668F
	Pilot IID Atmospheric (includes nat & pro orifice) built after 06/01/2000	002003F	002003F	002003F	002003F
	Pilot Nat. IID Low Nox	008155F	008155F	008155F	008155F
5-P	Pilot Orifice Nat. MV	003901F	003901F	003901F	003901F
	Pilot Orifice Pro. MV	003902F	003902F	003902F	003902F
7-P	Pilot Orifice Nat. IID .020	003903F	003903F	003903F	003903F
	Pilot Orifice Pro. IID .012	004308F	004308F	004308F	004308F
9-P	Pilot Generator MV	600019B	600019B	600019B	600019B
12-P	Ignition Control IID	004817B	004817B	004817B	004817B
	Ignition Control IID Lock	004818B	004818B	004818B	004818B
13-P	Pilot MTG Bracket MV	306693	306693	306693	306693
14-P	Pilot Mounting Bracket IID Atmospheric	306692	306692	306692	306692
	Pilot Mounting Bracket IID Low Nox	008082F	008082F	008082F	008082F
15-P	Lighter Tube (MV Units Only)	062996	062996	062996	062996
16-P	Pilot Tube	004078F	004078F	004078F	004078F
17-P	Hi Tension Wire IID	002654B	002654B	002654B	002654B
	Hi Tension Wire IID with Pilot Electrode	007864F	007864F	007864F	007864F
18-P	Pilot Shield	307223	307223	307223	307223



CALL OUT	DESCRIPTION	185	265	335	405
<b>R</b>	<b>REFRACTORY</b>				
1-R	Refractory Common (Left & Right)	005282F	005282F	005282F	005282F
2-R	Refractory Uncommon (Front & Rear)	005283F	005284F	005285F	005286F
3-R	Refractory Retainer Kit	005287F	005288F	005289F	005290F
4-R	Insulation Strips	006900F	006900F	006900F	006900F
<b>S</b>	<b>SHEETMETAL</b>				
1-S	Jacket Top (Louvered)	005303F	005304F	005305F	005306F
2-S	Flue Collector (Units with Capron Header)	006740F	006741F	006742F	006743F
	Flue Collector (Units with Metal Header)	005307F	005308F	005309F	005310F
3-S	Door Assy.	005315F	005316F	005317F	005318F
4-S	Screw & Retainer	006744F	006744F	006744F	006744F
5-S	Access Panel Set (3 Pcs.) (Units with Capron Header)	006745F	006745F	006745F	006745F
	Access Panel Set (3 Pcs.) (Units with Metal Header)	005277F	005277F	005277F	005277F
6-S	Side Panel Right	005300F	005300F	005300F	005300F
7-S	Side Panel Left	005301F	005301F	005301F	005301F
8-S	Side Panel Cap	005302F	005302F	005302F	005302F
9-S	Rear Panel Kit (2 Pcs.)	005278F	005279F	005280F	005281F
10-S	Sub-Base for Combustible Flooring	005182	005183	005184	005185
11-S	Poolstat Cover/Lock	005198	005198	005198	005198
12-S	High Limit Cover	005294F	005294F	005294F	005294F
13-S	Base Shield (Not Shown)	008558F	008559F	008560F	008561F
<b>V</b>	<b>VENTING</b>				
1-V	Indoor Stack Kit (Includes inner adapter panel)	006696	006697	006698	006699
2-V	Stack Adapter	008895F	008896F	008897F	008898F
3-V	"Pagoda" Top	007990	007991	007992	007993

<b>CONVERSION KITS**</b>	<b>185B</b>	<b>265B</b>	<b>335B</b>	<b>405B</b>
<b>Gas Conversions</b>				
Nat. to Pro. MV Pilot	004690B	004690B	004692B	004692B
Pro. to Nat. MV Pilot	005319F	005319F	005320F	005320F
Nat. to Pro. IID Pilot	N/A	N/A	N/A	N/A
Pro. to Nat. IID Pilot	N/A	N/A	N/A	N/A

\*\* Gas conversions are to be done only by a qualified agency.



**LIMITED WARRANTY**  
**RAYPAK RESIDENTIAL SWIMMING POOL AND SPA HEATERS**  
**GAS MODELS 185, 265, 335 & 405 MILLIVOLT**  
**185, 265, 335 & 405 ELECTRONIC**

**GENERAL**

Raypak, Inc. warrants that the cabinet, burner tray (minus controls) and refractory will be free from defects in materials and workmanship under normal use and service for a period of **FIVE YEARS FROM THE DATE OF ORIGINAL PURCHASE FOR A SINGLE FAMILY RESIDENCE (ONE YEAR IF OTHER THAN FOR SINGLE FAMILY RESIDENCE USE)**. All other parts of this product are warranted by Raypak to be free from defects in materials and workmanship under normal use and service for a period of **TWO YEARS FROM THE DATE OF ORIGINAL PURCHASE FOR A SINGLE FAMILY RESIDENCE (ONE YEAR IF OTHER THAN FOR SINGLE FAMILY RESIDENCE USE)**. In accordance with the terms of this warranty, we will furnish a Raypak replacement for any defective part or repair the part at our option. The replacement or repair will be warranted for only the unexpired portion of the original warranty. Labor costs for removal or reinstallation of parts are not covered by this warranty, nor are shipping charges to or from Raypak's designated repair center. This warranty does not cover rusting or corrosion on cabinet or burners that does not affect heater's operation.

**WARRANTY CONDITIONS**

This warranty applies only to the heater at its original place of installation. This warranty will be void if the heater is installed in violation of applicable local codes and ordinances or if the rating plate or serial number is altered or removed.

**WARRANTY EXCLUSION**

*This warranty does not cover defects or malfunctions resulting from:*

- 1. Failure to properly install, operate or maintain the heater in accordance with our printed instructions;*
- 2. Abuse, alteration, accident, fire, flood, freeze and the like;*
- 3. Misuse or neglect, including but not limited to, freeze-ups, operating the heater with the cabinet door off, having flow restrictions or obstructions between the heater outlet and the pool/spa, or not maintaining a proper chemical balance (PH level must be between 7.4 and 7.8 and total alkalinity between 100 and 150 PPM. Total dissolved solids (TDS) must be no greater than 3000 PPM);*
- 4. Use of non-factory authorized accessories or other components in conjunction with the heater.*

**HOW TO MAKE A CLAIM**

Immediately notify the dealer from whom the heater was purchased, supplying model and serial numbers of the unit, date of purchase, and a description of the problem. The dealer should then promptly contact Raypak about the warranty claim, and for the location of Raypak's nearest designated repair center. (If the dealer for any reason is not available, call or write Raypak directly at the address shown below, Attention: Warranty Service). After such notification has been given and Raypak has advised the location of its designated repair center (which may be the dealer), bring or ship, transportation prepaid, the defective part for replacement or repair to the designated repair center. However, Raypak reserves the right at all times to inspect the claimed defect and verify warranty coverage at its factory.

**MISCELLANEOUS**

No one is authorized to make any other warranties on our behalf, ANY IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE APPLICABLE WARRANTY PERIODS SPECIFIED ABOVE. RAYPAK'S SOLE LIABILITY WITH RESPECT TO ANY DEFECT SHALL BE AS SET FORTH IN THIS WARRANTY AND ANY CLAIMS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING DAMAGE FROM WATER LEAKAGE) ARE EXCLUDED. Some states do not allow limitations on how long an implied warranty lasts, or for the exclusion of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

We suggest you immediately complete the information below and retain this Warranty Certificate in the event warranty service is needed. Reasonable proof of the effective date of the warranty must be presented; otherwise, the effective date will be based upon the date of manufacture plus THIRTY (30) Days.

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Name of Owner	Name of Dealer
Address	Address
Model No.	Serial No.
Date of Purchase _____	

**RAYPAK, INC.**, 2151 Eastman Avenue, Oxnard, CA 93030 • (805) 278-5300 FAX (800) 872-9725  
**RAYPAK CANADA LTD.**, 2805 Slough Street, Mississauga, Ontario L4T 1G2 (905) 677-7999 FAX (905) 677-8036



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